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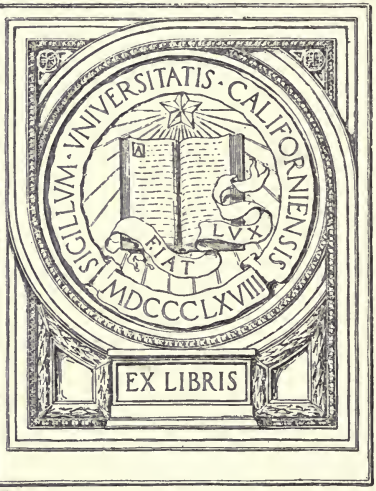

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BULLETIN

Published by the West Virginia Department of Agriculture,
Charleston, W. Va.

MARCH 1916 NUMBER 15

The Food of West Virginia Birds

By
Earle A. Brooks.

HOWARD E. WILLIAMS
Commissioner.

Entered as Second Class matter September 17, 1915, at the Post Office, at Charleston, W. Va., under the Act of Congress, June 6, 1900.

CEDAR WAXWING

(*One-half natural size*)

Order—PASSERES
Family—BOMBYCILLIDÆ
Genus—BOMBYCILLA
Species—CEDRORUM

National Association of Audubon Societies

THE FOOD OF WEST VIRGINIA BIRDS.

By
Earle A. Brooks.

A STUDY IN THE ECONOMIC VALUE OF THE BIRDS OF WEST VIRGINIA, WITH SUGGESTIONS IN REGARD TO THE PROTECTION OF OUR MOST USEFUL SPECIES

Published by Hon. Howard E. Williams,
State Commissioner of Agriculture.

Charleston, West Virginia.
1916

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INTRODUCTION

Purpose.

This bulletin on "The Food of West Virginia Birds" is published for the purpose of giving information concerning the feeding habits of these feathered friends of ours, to the fruit-grower, the grain-producer, the school children of our State, the owners of tracts of woodland and to all who depend for their daily bread upon the products of the soil. This bulletin is not a treatise on economic ornithology, but is a brief study in some of the relationships which our birds sustain to the wild and cultivated fruits, the vegetables and grains and grasses, the weeds and insects that have become our enemies, and the trees and lumber products, and has to do with some of the most vital questions that come before our agricultural communities. All these facts in regard to the food of our birds are given here with the hope that those who read may really know how much good our birds are doing and how carefully they should be protected.

3-28-49

The Need.

All who have noted the decrease in the numbers of our birds, the increase in the number of harmful insects, the exceeding great difficulties that must be met by those who raise grains, fruits or vegetables, and the attendant high cost of living know that there is need for the protection of birds. The scarcity of birds permits the multiplication of insects and the growth of weeds; these growing weeds hinder the farmer's crops and cause him endless labor, while the ever-increasing hordes of noxious insects devour roots, stalks, leaves, flowers, fruits and seeds that are produced in his fields; these great difficulties that lessen the production on all our farms add to the cost of all farm and forest products; prices are then much higher, and we all suffer in consequence. There is a great need for the diffusion of knowledge concerning our useful birds and a greater need that such protective measures be adopted that the birds may once more increase and take their place in the plans of nature.

I, S.

Preparation.

In the preparation of this bulletin much original work has been done, as the writer has been gathering data concerning the food of

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birds during a number of years. Much time has been spent in the field. With the generous help of others many facts concerning the food and food-habits of birds have been gathered together. Many papers and books have been read in order that the very latest and most dependable knowledge concerning all our birds might be gathered and placed at the disposal of our readers. Extended studies have been made in the relationship of birds to our wild and cultivated fruits.

Acknowledgments.

I wish to make grateful acknowledgment to those who have helped me in the work that is set forth in these pages. To Hon. Howard E. Williams, State Commissioner of Agriculture, I am especially thankful for making possible the publication of this bulletin; to Orr R. King, who has assisted in many ways in the field and office work, and to Charles Handley and Maurice Brooks, who have contributed many useful notes, I am under great obligation. Forbush's "Useful Birds and Their Protection," Hornaday's "Wild Life Conservation in Theory and Practice," Weed and Dearborn's "Birds in Their Relation to Man," and many bulletins published by the Biological Survey of the U. S. Department of Agriculture have been consulted freely. These have been of inestimable value in the gathering of the facts presented here. To the writers of these books and papers, who have made economic ornithology a life-long study, all should be most grateful.

The End Sought.

I most earnestly hope that this bulletin may fill the place for which it is intended. There is need for a simple and readable work of reference on the food of our birds, such a work as all may be able to understand and to use. As this publication goes forth to the school children, farmers and to all who are interested in studies of this kind, it may fill, in a measure this need. This, at least, is the purpose I have had in mind in its preparation.

For the privilege of using the colored plates to be found in this bulletin I am under obligation to the National Association of Audubon Societies. Cuts Nos. 7, 8, 9, 12, 22 and 23 are used by courtesy of the Massachusetts State Board of Agriculture.

EARLE A. BROOKS.

Weston, West Virginia
March 1, 1916.

Photo by E. H. Forbush

CONTENTS OF CROP OF A BOBWHITE.

This bird was killed by a mowing machine. The crop contained 46 Colorado Potato Bettles and 250 weed seeds.

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Photo by E. H. Forbush

Cat with bird that he has just killed.

CHAPTER I.

OUR WEST VIRGINIA BIRDS.

Before taking up the study of the food of our birds we should know something of the numbers and the great variety of species which we have in West Virginia. Before one can decide concerning the status of the Kingbird and its relations to the honey bees, which it sometimes destroys, this species must be known and separated from the great number of other birds of about the same size and color; before the Cooper's Hawk is condemned as a ruthless destroyer of our chickens, the farmer should be able to distinguish this beautiful, swift-flying species from other Hawks; before our children are encouraged to kill off all the English Sparrows and to rob their nests, they must be able to distinguish them from the large number of useful native American sparrows that differ very little from this alien pest; and before one can determine the usefulness or the harmfulness of any species he must be able to identify it and to distinguish it unquestionably from other birds that may be similar in size, color and form but very different in habits. A knowledge of our West Virginia birds is very necessary to those who would know their real relationships to the "grass of the field," the vegetables, fruits and grains.

Numbers.

We have in West Virginia about two hundred and sixty different kinds of birds. Many states have a larger avi-fauna than this. The number of our species is somewhat limited because of the fact that we have no sea-shore no lakes and few marshes. This accounts for the rarity of some of our water-fowl and the absence of others. If we had even a few large lakes or a few miles of sea coast, our list of species would be much greater. However, the hills are a favorite resort for many of our more useful species and we have these in great abundance. Such families of birds as the Sparrows, Flycatchers, Vireos and Warblers are represented by great numbers of species. Of these grayish-green birds known as the Vireos or "Greenlets" we have seven species all differing but slightly in size and color. There are nine species of Flycatchers. Thrushes are present in good numbers. Of the Sparrows we have thirty different native species and these, at least many of them, do not vary greatly in size, color nor form. Our largest family of small woodland birds is the family of Warblers which consists of thirty-six species. These are most beautiful in color and many of them are exceedingly rare, some being seen only once or twice in the life-time of an observer. Though the number of species is almost as great as it has been for many years, the number of individuals is far less. This decrease has been caused by the wanton destruction of millions of birds. In one of Dr. Hornaday's chapters (*Wild Life Conservation in Theory and Practice*) he says, "The appalling destruction of wild life that for forty years we have been witnessing on every hand is chargeable to

greed, slothfulness and ignorance. The same low order of intelligence that denuded China of her forests, and turned her hillsides into gullied barrenness, has swept away fully 95 per cent. of the birds and mammals of America that were most useful to man." Still we have birds in great numbers in field, forest and swamp; among the hills, along our rivers and high up in the mountains; in winter, spring, summer and fall; and in every possible condition of environment. Though not quite so numerous in species as formerly and far fewer in numbers of individuals, birds are still common, and one does not need to go far in any place in West Virginia to find a number of interesting things take place in the bird world. With careful protection the numbers of our useful birds may be far greater within the coming years.

Variety.

Our birds are found in great variety as well as in great numbers. In the first place they vary in size. Among our small birds are to be numbered the Ruby-throated Hummingbird, the Blue-gray Gnat-catcher and the Golden-crested and Ruby-crowned Kinglets; while among our large birds we have the Eagles, the Turkey Vulture, the Great Blue Heron and the Wild Turkey. Some are scarcely larger than a bumble bee, while others are almost as tall as a man and have great extent of wing. In the second place, our birds differ in form and color. The Ruffed Grouse, Wild Turkey and Bobwhite are compact in form, but the Herons and Bitterns are loose-jointed and awkward; the Swallows and Terns are most graceful in flight, but other species fly with great difficulty; some are tall, others are low; some are brilliantly colored, others are brown and obscure; the Snowy Owl, the Snowflake and some of the Herons are white, while the Blackbirds, the Crows and the Raven are black; among the Warblers there are creatures so exquisitely colored that one doubts the statement sometimes made that tropical species are more gorgeously colored than those of temperate regions, while some of the Sparrows, the Vireos and Flycatchers are as modest as a quaker in their attire. In quality of song there is also much difference among our birds. Among those that have no song may be listed the Cedar Bird, the Ruby-throated Hummingbird and several of the Flycatchers. Our best songsters are the Wood Thrush, the Veery, Robin, Bluebird, Louisiana Water-Thrush, Bachman's Sparrow, Vesper Sparrow, Song Sparrow, Winter Wren, Cardinal, Carolina Wren, Mockingbird, Brown Thrasher, Catbird, Fox Sparrow, Field Sparrow, Rose-breasted Grosbeak, Warbling Vireo, Solitary Vireo, Cairn's Warbler, Baltimore Oriole, Orchard Oriole, Bobolink, Red-winged Blackbird and others of slightly less musical ability. Our study of the food-habits of birds will convince us, also, that birds are not all alike in their habits nor in their usefulness. Some are very useful, others are of questionable status, while a few are positively harmful. The endless variety in our birds makes them interesting, and calls for a careful study of each species.

Work Done.

Thus far, in the research work that has been done in West Virginia, comparatively little attention has been given to the birds. Some persons have given much time and many have given a little time to this profitable study. The great naturalists Audubon and Wilson did a little work in the territory that is now included in West Virginia, about one hundred years ago. At a later date, about fifty years ago, such eminent naturalists as W. E. D. Scott, William Brewster, Ruthven Deane, and Ernest E. Ingersoll worked within our State for a very short time, and left us some valuable notes. In more recent years Dr. Wm. C. Rives, Rev. W. E. Hill, Rev. C. Eifrig, Thaddeus Surber, Wm. D. Doan, J. Warren Jacobs, A. Sidney Morgan, Thomas A. Morgan, T. Z. Atkeson, A. B. Brooks, Fred E. Brooks, Garrett Campbell, Charles Handley, Miss Eva Fling, Harold Roush, and E. R. Grose have contributed to our knowledge of bird life. Others, also, have done their part, but there yet remains much to be done. Vast portions of the State have never been visited by any naturalist, and many inviting fields are yet to be visited. Of those who have gathered data concerning West Virginia birds few have studied their food-habits. This is, therefore, a comparatively new subject to be considered.

The Plan.

In making the plan for this bulletin the writer has thought it well to study the birds by groups and families. After the three introductory chapters, these various families and groups of birds are taken up in a systematic way. Should any one care to know something of the habits and economic status of the Hawks, Sparrows, Thrushes, or any other group of birds, he has but to turn to the chapter in which these species are discussed. There he will find certain facts for his guidance in the study of these species. Thus the whole economy of our West Virginia bird life may be studied and conclusions may be drawn by those who really care to know how great a part the birds play in the life of those who are interested in the products of our rivers, forests, gardens, orchards and grain-fields.

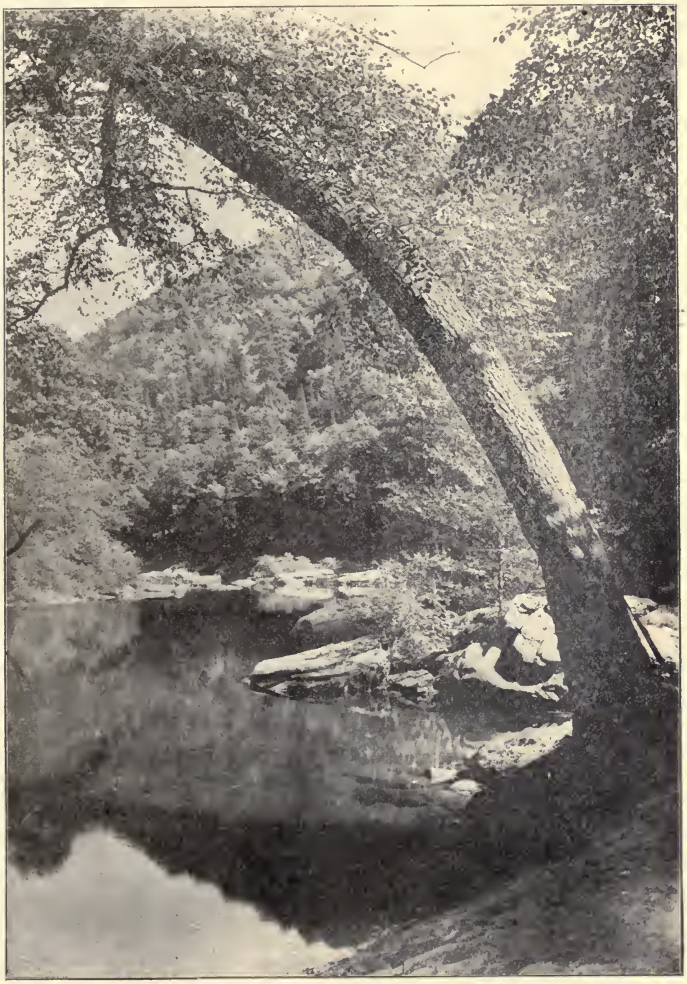

Photo by Fred E. Brooks

West Virginia Stream bordered by woods in which countless Warblers reside.

Photo by A. B. Brooks

Original Cedar Grove near Weston from which about 400 young Cedars have sprung up from seed scattered by the birds. Small Cedars in foreground are all under trees or along fence-row where birds have alighted and dropped the seeds.

CHAPTER II.

ECONOMIC ORNITHOLOGY.

Definition.

The study of the food and food-habits of birds is called Economic Ornithology. In this particular branch of bird-study we consider all the things that birds eat, their useful food-habits and their harmful food-habits, their place in maintaining the balance of nature, and the help or hindrance they bring to us in our life work, and we study all the beneficial or baneful effects which they have on all other forms of life, including all other birds, insects, mammals, reptiles, crustaceans, and man himself. Economic Ornithology is the most practical phase of the interesting science called Ornithology and is fascinating to those who pursue the intricate questions involved. It is a pleasure, too, because the student of the food and food-habits of birds needs not only to be much in the open air, the woods, fields and orchards, but he must have a general knowledge of birds as well as some knowledge of forestry, of fruit-bearing and nut-bearing shrubs and trees, weeds, insects, mammals, and a host of other things that make up the environment of a bird. No one can successfully study the food of birds without getting a careful training in systematic nature work. Economic Ornithology is a practical science and those who add new facts to our present store of knowledge pertaining to the food of birds will make a valuable contribution to the welfare of all who are interested in economic problems and the practical things of life.

Kinds of Food.

In this chapter will be taken up many of the classes of food on which our birds depend. This will help us in our more detailed study of the groups of birds. By glancing over the headings in this chapter, one may easily see how many kinds of foods birds require and how omnivorous the birds really are. Some are fruit-eaters, and are called frugivorous; others eat grain and seeds, and are called granivorous; many species subsist largely upon insects and are called insectivorous; those that feed on flesh are called carnivorous, and those that eat fish are piscivorous; while those that have a greatly varied diet are known as omnivorous birds. Since the variety of the food of birds is so great, their relationships are many. The Hummingbirds sip the nectar of the daintiest flower; the Yellow-bellied Sapsucker drinks the sweet sap from a fountain of his own making in the bark of a birch or maple tree; many species enjoy the delicious flavors of wild and cultivated fruits quite as well as we do; a host of birds eat insects; some like fish and frogs; the Hawks and Owls prey upon mammals and other birds; many of our more common species feed largely upon weed seeds and grains, while the Turkey Vulture and a few other species gorge themselves with refuse matter of various kinds. This chapter sets forth the kinds of food that birds eat and suggests many facts that

are of interest because of the quantity and variety of the birds' daily fare.

Birds in Relation to Trees and Forests.

The lumber industry is one of the most valuable of all our manufacturing enterprises. Under normal conditions West Virginia ought to produce 1,600,000,000 feet of lumber per year. At an average of $20.00 per thousand feet the gross income from lumber sales in our own State would be $32,000,000.00 each year. In 1911 about 26,000 men were engaged in the various phases of the lumber industry in West Virginia. Together these had an annual income of not less than $16,000,000.00*. In addition to the immediate profits that come to hosts of men as they cut the trees in the woods, haul or otherwise transport the logs to the mills, saw them into merchantable materials of different kinds, finish the boards into a condition fit for use in building; in addition to the great gains that come to the owner of wood-lots and to the owner of large timber tracts as they dispose of their wood and wood-products to others, and in addition to the pecuniary gains that come to carpenters and all workers in wood, we have, in our every day life, a thousand advantages that come to us from our forests, our trees and the things that are made of wood. The forests of West Virginia are of incalculable pecuniary worth to the State.

Aside from the immediate gains that come to so many of our citizens as they engage in the lumber business, as they sell their forest lands and as they profit in many ways from lumber and the many things that are made from wood and in addition to the comforts that come to us all because of this common building material, there are other advantages in which we all share, when we consider the economic and esthetic value of our trees and our forests. For centuries wood was the common fuel of our country and is still used in great quantities for that purpose. The forests conserve our water supply by storing up in the masses of leaves and decaying vegetation, that accumulate under the trees, the rain that falls, and, thus, holding it, give it out gradually to the springs and, by evaporation, to the cloud masses that form in our mountain sections. By this process floods are held back, droughts are made less probable, and the moisture is more evenly distributed over all the land surface. Our forests also contribute to the general health of the State and are the source of much pleasure to an increasing number of campers, hunters, fishermen and naturalists.

Not only are trees valuable in the large groups that we call forests or woodland, but they are of great value considered specifically or individually. A well-formed tree is one of the most beautiful objects in all the natural world. The flowers and the foliage produced by some of our trees add much to the landscape, and the shade of a tree is most delightful. Some species produce valuable fruit and others yield nuts. In many ways trees are of value to every man, woman and child within our State. Their conservation is most important.

The birds do much to protect the trees and the forests. Were it not for the presence of the birds it would be only a few years till the

trees of West Virginia would be denuded of every green leaf and even the branches and trunks devoured by the many kinds of insects that would increase abnormally without the birds. There are at least three important relationships which birds sustain towards the trees. These will be briefly discussed.

1. Birds destroy many kinds of insects that are hurtful to the trees. The Woodpeckers, Nuthatches, Creeper and some of the Warblers feed upon many kinds of insects that affect the bark, cambium and wood of the trees. They are the guardians of the tree-trunks. Among the branches the Sparrows, Warblers, Vireos, Cuckoos, Kinglets, Titmice, Thrushes and many others gather insects throughout the greater part of the year. The Swallows, Swifts and Flycatchers patrol the air and there destroy many tree enemies.

2. The birds distribute the seeds of many tree species and thus help in the great work of reforestation. Each year millions of nuts are carried by Blue Jays, Grackles, Woodpeckers, Nuthatches, Titmice and others and are scattered in every direction. Many of these fall to the ground, germinate the following spring and start new trees. The seeds of fruit-bearing species are freely scattered in this same manner. Under the section in which I discuss the birds in their relation to fruit this point will be spoken of in detail.

3. Birds are sometimes injurious to trees. Many species are punctured by the Yellow-bellied Sapsucker and perhaps are occasionally killed in this manner. These punctures made in living trees by this species of Woodpecker, and perhaps by a few other species, often result in decay, or are the cause of attack by insects or fungus diseases. Dr. A. D. Hopkins, however, has pointed out the fact that these wounds often cause a birds-eye effect in some of our trees and thus enhance their value when cut and sawed into lumber. There is no doubt that insects sometimes enter through the punctures made by birds and that the spores of fungus diseases find entrance there. It is believed by many that the chestnut blight fungus is carried from tree to tree on the feet of the birds. Yet the harm done by the birds to our trees is as nothing when compared with the good they do.

Birds and Fruits.

Great numbers of our birds vary their daily diet by feeding upon fruits of various kinds. Such birds are sometimes very destructive to certain valuable cultivated fruits. Sweet cherries, sour cherries, strawberries and grapes are eaten by a number of our birds. In reply to a questionnaire sent last summer to a number of prominent grangers throughout the State the following information was forthcoming. Fifteen species of birds are said to feed upon the cultivated sweet cherry, and the greatest proportion of guilt falls upon the Robin, Catbird, Flicker and Red-headed Woodpecker; thirteen species are said to feed upon the fruit of the cultivated sour cherry, and the same birds are named as the greatest offenders; the Robin, English Sparrow, Catbird, Crow, Bob-

*See A. B. Brooks', "Forestry and Wood Industries", W. Va. Geolog. Survey, p. 20.

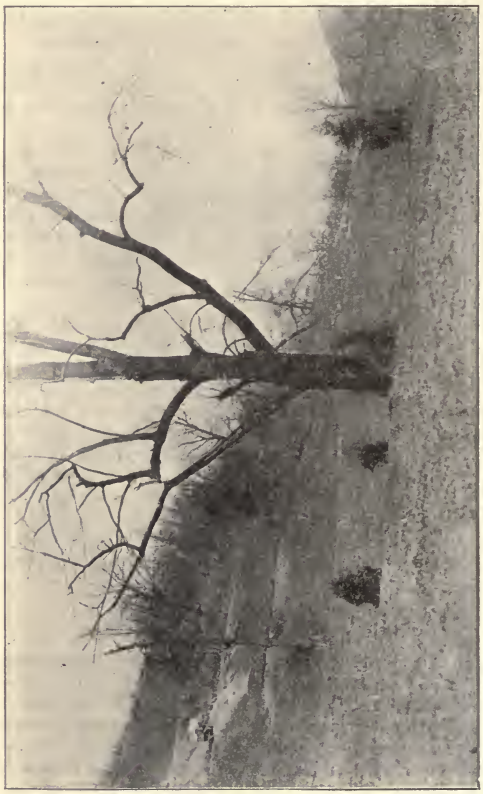

Photo by A. B. Brooks

Small Red Cedars growing under Wild Cherry Tree, from seeds dropped by Birds.

white, Flicker, Cowbird, Cedarbird and Bluebird are said to be destructive to strawberries; six species are said to feed upon grapes and the same number of birds are said to have a fondness for currants. While this information can not be considered as strictly accurate, yet it shows in a general way that many birds eat our cultivated fruits and it helps to lay the blame on the culpable species. However the fruit-eating habits of many of our birds is not altogether harmful. As may be learned by reading the following paragraphs, this habit is exceedingly helpful to some of our great industries, since by the sowing of the seeds of wild fruits the work of natural reforestation is largely kept up.

During the past season careful investigations were made in regard to the fruit-eating habits of many of our birds. My assistant in this work spent a great many days in the field, and the writer had the privilege of making many original observations along this line. Others, too, have helped in this part of the work. Several interesting facts were developed along this line. Some of these are set forth here for the first time.

I have come to the deliberate conclusion that the destruction of cultivated fruits is not so great as we commonly believe. In a cherry orchard belonging to Mr. R. L. Darnall, to whom I am exceedingly thankful for help given in the pursuance of some of my investigations, there were about twenty trees bearing fruit of the black sweet variety. After observing the work of birds in this orchard for a number of days we found that in the course of an entire week no more than one gallon of cherries was eaten. Though this orchard was in a place where there were many birds, and though the birds came and went freely, only a little more than one pint of cherries was eaten each day. In the middle of this orchard of black sweet cherries there grew a wild mulberry tree that bore quite a crop of fruit. Though I watched this tree carefully for one half day, not a single bird came to eat of the fruit. The Tufted Titmice and other species came and ate the cherries that grew near by, but none ate the mulberries. Only once or twice during several days of observation did my assistant, Mr. King, see the birds take a mulberry from the tree that stood in the midst of the cherry orchard. The birds of all kinds seemed greatly to prefer the cherries. It has been stated frequently that the planting of mulberry trees about a cherry orchard would be the means of attracting the birds from the cherries, but this observation of mine seems to disprove that theory. However, the Russian mulberry may afford a better protection to the cherries than does the wild variety.

It is undeniably true that much valuable fruit is destroyed by some of our birds, yet the good the birds do should be considered before they are killed for this one offence.

My most interesting studies during the past summer have been in regard to the birds and their habit of feeding upon the wild fruits of many kinds. Our West Virginia forests abound in wild fruits of many varieties. Some of these fruits ripen very early in the season; others mature in mid-summer; some do not ripen till fall, and some varieties adhere to the vines or bushes all the winter long. Throughout all the year there is wild fruit of some kind available to the birds that like it. I have

been surprised to find how many kinds of wild fruits we have, how many are eaten by the birds and what a large per centage of the food of birds consists of the many varieties of fruits that grow in the fields and the woodlands. The fact that so many birds feed upon wild fruits has led me to note that among the small trees and shrubs that soon spring up after the forests are cut down or destroyed in any manner, by far the larger number are the fruit-bearing varieties. Let us notice this process of reforesting briefly. When a tract of land is burned over and all growing trees and plants destroyed and even the humus burned, the land is practically worthless in that condition. Very soon nature begins to repair the great damage done. The wind soon blows the spores of ferns and mosses, the weed seeds that bear pappus, and these are the first forms of vegetation to appear; during the years that have gone by thousands of birds have been carrying tens of thousands of seeds and sowing them broadcast over this tract of land, since they swallow many of the seeds of the fruits they eat and cast them out at their convenience; these fruit seeds soon germinate, since they have not been killed by the fire, and soon wild "bird" cherries (the name is very suggestive), poke berry bushes, sassafras, sumacs of several kinds, Hercules' club, the dogwoods, elder bushes, holly of several kinds, the haws, etc., etc., are coming up everywhere; the squirrels and birds have carried nuts, and these begin to grow. Thus the former forest is replaced slowly by a new forest, and in this process the birds have a very important part. It should be remembered that most of the first shrubs to grow up in old fields or in places where the virgin forest has been destroyed are fruit-bearing varieties.

As an illustration of the usefulness of birds as planters of the seeds of wild fruits I may give the following illustration. Last summer I noticed a beautiful holly tree tthat stood not many feet from an old fence. Along the fence-row perhaps fifteen or twenty small holly trees were springing up. My only possible conclusion was that the birds had eaten the holly berries, had flown to the convenient fence, and there dropped the seeds. Thus the seeds were scattered by the birds and new holly trees were growing all the while. In such manner many useful trees are propagated, and the forests are renewed constantly. For this service we are under great obligations to the birds.

Birds and Grain.

Several species of birds are destructive to grain. In the questionnaire mentioned above, the Crow, Mourning Dove, Chewink, Bronzed Grackle, English Sparrow, Red-winged Blackbird, Robin, Flicker, Cardinal and Catbird are accused of "pulling" corn; the Crow, Red-headed Woodpecker, English Sparrow, Flicker, Bronzed Grackle, Red-winged Blackbird and Cowbird are said to eat the corn when "in the milk." Others are accused of eating wheat and oats. I have seen fields of corn in which great damage had been done by Crows in pulling the sprouting corn stalks. However, it should be remembered that the Crows eat insects that are destructive to corn and thus partly atone for the damage done. I have also seen fields in which at least half the ears of corn had

been opened by the Red-headed Woodpeckers when the corn was "in the milk" and many of the ears greatly injured. This damage, however, is not general, and one does not often see a field in which these Woodpeckers have carried on their destructive work. Very little damage is done by the birds to the wheat and oats, though English Sparrows are quite destructive at times.

Birds and Vegetables.

Few vegetables are injured by the birds. The Baltimore Oriole is accused of eating green peas, though I think this accusation is rather traditional than real; the Goldfinch or "Lettuce Bird" feeds on the tender leaves of some of our succulent garden plants, but no real harm is done by them; and sweet corn is sometimes attacked by the Woodpeckers. But altogether the injury done by birds to vegetables is not worth mentioning. On the other hand it would be impossible to grow vegetables were it not for the birds that destroy the insects that feed upon them. Throughout this bulletin reference is made in many places to the birds that eat insects that are injurious to vegetables.

Birds and Weed Seeds.

As destroyers of weed-seeds birds do some of their very best service. The Sparrows are particularly helpful in this way. Among the hardships of the farmer in West Virginia is the necessity of working continuously through the entire summer to keep down the great number of weeds that spring up everywhere. Each year he must keep up the fight and so persistent are some species of weeds that they increase in spite of all the pulling, hoeing and plowing. Of late certain weeds have been imported and these add to the troubles of the past. On account of the great amount of labor made necessary by the abounding growth of weeds of almost unnumbered varieties, the agriculturist, horticulturist, market gardener and home gardener gladly welcome every means of abating the weed nuisance. Our greatest help comes from the birds. When many of the insects are dead and others are dormant, when the cold days of winter come and many of the hardier species of birds remain with us, they attack the great stores of food that nature has provided for them, and many of the birds turn to the abundant crop of weed seeds that ripen each year. A number of the Sparrows spend the winter in West Virginia. These, especially, feed upon that sort of food. In one of Prof. Beal's publications he says, "Examination of many stomachs shows that in winter the Tree Sparrow feeds entirely upon seeds of weeds; and probably each bird consumes about one-fourth of an ounce a day. In an article contributed to the New York Tribune in 1881 the writer estimated the amount of weed seed annually destroyed by these birds in the State of Iowa. Upon the basis of one-fourth of an ounce of seed eaten daily by each bird, and supposing that the birds averaged ten to each square mile, and that they remain in their winter range two hundred days, we shall have a total of 1,750,000 pounds, or 875 tons, of weed seeds consumed by this one species in

a single season." This illustration proves in a most conclusive way how much good a single species may do. Multiply the amount of good done by the Tree Sparrows by the large number of like birds that remain here over winter and we may begin to see how important a function the winter birds perform in the destruction of weed seeds. We have not, in the past, fully appreciated the helpfulness of birds in subduing the masses of weeds that grow up everywhere as often as spring and summer return. In their excellent book entitled "Birds in Their Relation to Man" Weed and Dearborn say, "The largest proportion of the seeds eaten by birds are produced by herbs, most of which are useless, while many of them are noxious weeds. The quantity of pestiferous seeds thus annually destroyed is enormous, and man is deeply indebted to the birds that destroy them. The great group of many-flowered plants, the order *Compositae*, supplies food for a multitude of small finches. Early in the season the downy heads of the dandelion call Sparrows and Goldfinches to lawns and road-sides. A little later horse-weeds and thistles furnish similar food to the same hungry company. The ragweed, which springs up unbidden everywhere, is perhaps the best bird provider in this family, in grain-fields along road-sides, and in worn-out pastures this plant affords the birds a feast unsurpassed either in amount or duration. During the latter part of their stay the summer Sparrows largely depend upon it; while in the winter Bob-whites, Goldfinches, Redpolls, English Sparrows, Snow-flakes and Horned Larks make festival among its miniature branches. Even the Red-headed and Red-bellied Woodpeckers as well as the Flicker have been known to partake of these ragweed seeds. * * * * Knotweed, sheep-sorrel, dock, bindweed and many more—each contributes to the birds that frequent its station. * * * * * The seeds of the pigweeds, hemp, mullein, and a host of other weeds belonging to less numerous families are also freely drawn upon for the support of bird life." Most of the seeds eaten by birds are crushed and their germinating power is destroyed. Therefore the birds which feed upon these seeds do not scatter them as the fruit-eating birds scatter the indigestible seeds of fruit. The seeds the birds eat are crushed and digested and can not grow. This means that practically all the millions of pounds of weed seeds eaten each fall, winter and spring in West Virginia are forever destroyed. What a wilderness of weeds would spring up if the birds did not help so effectively in keeping them under control!

Insect Food of Birds.

Another portion of this chapter must be given to the study of the insect food of birds. By far the largest number of our species are insectivorous, and of all the food taken by our West Virginia birds in the course of the year I suppose that fully three-fourths is made up of insects in the egg, larva, pupa or imago stage. The incalculable good done by the birds in the destruction of insects can not be fully comprehended till we face some of the almost overwhelming facts of the insect world, nor can we comprehend fully then, for the facts and figures are beyond our powers to understand. A few of these facts may be

given as suggestive of what might be our condition if birds should cease to hold in check the many kinds of insects. More than three hundred thousand kinds of insects have been described and every year many new species are being discovered by entomologists. No one has yet ventured to make a catalogue of the different kinds of insects to be found in West Virginia since the list would be so long as to make such an undertaking practically impossible. It is probably no exaggeration at all to say that our West Virginia list of species of insects numbers from five to ten thousand. And not only are there numerous species, but individuals of some species are so abundant as to be beyond all reckoning. One famous entomologist tells us that he saw at a single glance more individuals of a certain species of snow flea than there are human beings on the entire face of the earth. Another tells of estimating the number of plant lice on a single cherry tree and finding that they numbered twelve millions. Sometimes army worms, chinch bugs, Rocky Mountain locusts, certain species of beetles and other forms of insect life come in innumerable millions. When one considers the enormous reproductive capacity of insects, their present numbers and the possibilities of unchecked increase in the future one shudders at the thought and dreads the day when the crawling, creeping, buzzing destructive creatures may be far worse than they are now. Prof. Riley tells us that the twelfth brood of the hop vine aphis, coming in one season from a single pair, would number, if left unchecked by natural enemies, not less than 10,000,000,000,000,000,000,000, a number that is almost infinitely beyond our powers of comprehension. Most of our insects increase very rapidly, and, if left unchecked by natural enemies, would soon lay waste and bare the entire surface of the earth. These billions of insects, it must be remembered, eat most voraciously. They require far more food than most forms of animal life. Dr. Forbush says, "Many caterpillars daily eat twice their weight in leaves; which is as if an ox were to devour, every twenty-four hours, three-quarters of a ton of grass." Insects develop very rapidly, in most cases, and require much food to keep up this ceaseless growth. In view of the uncounted numbers of species, the billions of individuals of some of these species, their rapid rate of increase and the vast amount of food required by them, it becomes very evident that all ordinary and extraordinary, all natural and all artificial, means of restricting the increase of harmful species of insects is absolutely imperative. Of all known methods of curbing the geometrical progression of increase among the insects, none is better than nature's own effective way of sending birds to eat them up. Some birds scratch among the leaves and find the insects that are working on the ground or that infest the leaves and debris; others feed on insects that are found in pasture lands among the grasses, and lower forms of plant life; some search continuously among the shrubs and lesser trees; others climb over the trunks and branches with vigilant eyes; and still others catch the insects that fly about in the air. Some birds take the dormant insects that live over winter and thus prevent the possible increase during the coming season; others eat eggs and the very smallest insect forms; while still others

come in great numbers in the spring, just as many insects are emerging from cocoon, pupa case, or egg and devour them before their work of destruction has begun. Some of the insects thus destroyed are useful but most of them are very destructive. The fact to be borne in mind in considering the insect food of birds is this, that the birds keep the

Photo by A. B. Brooks

Young Persimmon tree about one-fourth mile from cedar grove with eight young cedars growing immediately under its branches. Cedars planted by the birds.

harmful species of insects from becoming far more harmful, and they so hold in check other species as to keep them from becoming harmful. As may be seen, in the following pages, the birds are our friends in

protecting our crops from insect ravages and in holding in check one of the worst foes of all material progress.

Carnivorous Birds.

There is a large class of birds that are called Birds of Prey. These are the Hawks, Eagles and Owls. Their food consists of domestic poultry, game birds, song birds, mammals of many kinds, reptiles and insects. It is generally believed that, as a class, these birds are harmful and should be destroyed. In some cases this is true, but with most of the species it is not true. The Hawks and Owls that feed largely upon poultry and song birds are, of course, harmful and should be destroyed. However, in this large group of carnivorous birds we find many useful species. Some of the rodents and other small mammals which these birds destroy would become exceedingly harmful if allowed to increase. At times there have been outbreaks of mice and other small mammals which have threatened the destruction of much grain and other growing crops. Rabbits become harmful at times and in the west much injury is done by gophers, ground squirrels and prairie dogs. On these the Hawks and Owls feed and keep them from greater destructive work than they do at present.

Scavengers.

Another class of birds that is worthy of mention, because of their useful food-habits, are the scavengers. The best known representative of this group is the Turkey Vulture. As one goes toward the south where warm weather hastens the processes of decay there is the more need for the work of these carrion-eating birds. In this work of cleaning up the refuse matter the Turkey Vulture or "Turkey Buzzard" is assisted to some extent by the Crow and a few other species. The birds that do effective scavenger work should be protected most rigidly.

Water Birds.

Birds that live along streams, the water birds, shore birds, and others, depend upon fish and other forms of aquatic life for their food. Mr. Robert K. Robinson, of the Bureau of Fisheries at White Sulphur Springs, has written me that the Belted Kingfishers are quite destructive to the young fish in their ponds. He also says of the Green Heron, "For the time that these birds appear about the ponds, I regard them as the most destructive of all birds that prey upon the small fish in our ponds. On one occasion there was removed from one of these birds (which had been shot near one of our ponds) between 15 and 20 fingerling trout, from one and a half to two inches in length." The Phoebe is also said to feed to some extent upon the very small trout in the government ponds. The Osprey or Fish Hawk destroys some fish, but is so rare that its economic relationships are scarcely worth considering. Many of our other water and shore birds feed upon small fish, frogs, shell-fish and water insects. However, these species are of no particular importance from our practical standpoint and need not be discussed further.

Relationships to Human Life.

All these paragraphs in this chapter converge upon the final paragraph in which the relationships of birds to man are to be considered. Every thing the birds do that in any way helps us in our work, makes life easier and better, belongs in this chapter. It goes without saying that it must be *multum in parvo.* The paragraphs already written tell of many ways in which the birds help us. They protect our forests and orchards, they keep insects from devouring the foliage of our shade trees, they devour many of the insects that are seeking to destroy our vegetables, fruits and grains, they hold in check the great masses of weeds that spring up and choke the growing crops, they scatter the seeds of useful nut and fruit trees, they furnish us food, they sing for us and otherwise add to the beauty and joy of the world, and altogether they fill most admirably the place for which they were evidently created. In return for all this help in the work of life, man should give the most careful protection to the birds that so faithfully assist him in his ceaseless round of earning his daily bread.

CHAPTER III.

THE PROTECTION OF USEFUL BIRDS.

Why?

If birds do good, if they help us in our work, if they are our friends, they should be protected. If they do harm, if they make the work we have to do more difficult, if they are our enemies, they should be freed from all protection by law and by public opinion. But neither

Photo by E. H. Forbush

Bluebird with food for young.

one of these opposite theories is correct. All birds are not our friends, neither are all birds our enemies. Therefore the statement must be

modified and simplified until it is reduced to this:—All useful birds should be protected and all positively harmful birds may be destroyed. It is the purpose of this little book to help those who are interested in the birds to properly discriminate between the useful and the harmful species, and to suggest ways of destroying the harmful ones and means of protecting and increasing the numbers of the useful ones.

Campaign of Education.

A campaign of ornithological education should be begun at once in West Virginia. Boys, girls, teachers, horticulturists, orchardists, fruit-dealers, lumbermen, hunters, land-owners and every one else should be trained in the knowledge of our birds and their economic value. Our teachers should take up the subject of birds as the most attractive field of nature study and give the boys and girls in rural, town and city schools some definite knowledge of the usefulness of our birds. At farmers' meetings, in schools of higher grades and through the various channels of transmitting useful information the people should be acquainted with the value of bird life. A course in Economic Ornithology should be given at the State University. Illustrated lectures on this subject should be presented on many occasions for the diffusion of knowledge along this line. Literature should be scattered far and wide that the people may know just what our birds are and whether they are useful or harmful. Only two or three publications on the birds of West Virginia have ever been available for general distirbution, and these are now scarcely obtainable. The young people should know what the birds are doing and what would be the result should they cease from this work of general helpfulness. A campaign of education along these lines would be one of the very best means of protecting our birds.

Protective Societies.

Several societies have already been organized for the purpose of promoting bird protection. The West Virginia Audubon Society, with headquarters at Parkersburg, has been doing effective work and ought to have the hearty support of all friends of the birds. The State Forest, Game and Fish Warden has, for a number of years, been making efforts to educate the people along the lines of forest, game and fish protection and has, incidentally, done much for the protection of our song birds. The State Commissioner of Agriculture has taken up this good work and, through this publication, seeks to advance the cause of bird protection. The West Virginia Forest, Game and Fish Protective Association has also helped in this great work. Before its members addresses have been given and through its extended organizations literature has been distributed. A number of local Bird Clubs have done a great good in stirring up local sentiment in favor of the birds and in promoting bird study. Several individuals who have gathered some knowledge of bird-life have been centers of influence that have helped wonderfully in the cause of bird protection. We should not be unmindful

of the very effective nation-wide work of the National Association of Audubon Societies. Through their official organ, *Bird-Lore*, by means of high class literature and through a never-ceasing campaign for better laws for the protection of birds this organization has accomplished results that can never be estimated and that are not now fully appreciated.

Special Means of Protection.

Several specific methods of protecting the birds should be mentioned here. There are many effective methods that have been used. The plan of setting aside large tracts of land as game refuges, a plan now being carried out to some extent by our State Game Warden, will be most effective in West Virginia, as it has been elsewhere, in helping to increase the numbers of our birds. In several places in our State, persons who are interested in the birds are planting groves of fruit-bearing shrubs and trees that the birds may be attracted and preserved by the great quantities of fruit thus provided. If any farmer will plant out a small grove of wild mulberry, Russian mulberry, wild cherry, service berry, and other trees or such fruit-producing shrubs as the dogwoods, haws, sumacs, sassafras, hollies, raspberries, blackberries, elderberries, etc., he will be rewarded by having his own cultivated fruits somewhat protected and by the constant presence and help of large numbers of insect-eating birds. The thickets that may be left in some unused corner of farm, garden or orchard afford shelter to the birds and thus protect them from the cold and from some of their natural enemies. If all needless cats are destroyed, the bird population will greatly increase. In winter time food may be scattered out when there are long-continued snows and food is becoming scarce. Nesting places may be provided, and the birds may be encouraged in many ways to build their nests about one's premises. No nests should be destroyed except those of the more harmful species. A spirit of general friendliness manifested towards the birds will do much to protect them from their enemies and to encourage them to do well their part of the work of the great natural world.

Protective Laws.

All our migratory birds are now protected by Federal laws. Our State also has, in a somewhat modified form, what is called the Model Audubon Law for the protection of birds. If these laws were enforced as they should be, we would have an immediate increase in the numbers of our useful birds and the work of other protective agencies would be greatly lessened. By these two laws practically all of our birds excepting the Hawks, Owls, the Crow, Belted Kingfisher and English Sparrow are rigidly protected. All laws should be enforced and especially should such helpful laws as these have back of them the full power of enlightened public sentiment. Useful birds are protected by the laws of our State and this protection should be afforded them. The legal penalties and fines should be imposed whenever the laws are broken.

Propagation of Useful Species.

The propagation of certain useful species of Game Birds should be taken up in this chapter on the Protection of Birds. In many sections of our country much work is being done along this line. Not only are means used that our wild song and insectivorous and granivorous birds may increase in their native woodlands and fields, but experiments are being tried out for the propagation of song birds, under more or less artificial conditions; water-fowl are being reared in large numbers in certain places that have been prepared with this end in view; and game birds of native and imported species are being propagated under natural and artificial conditions as never before. In the introduction to his excellent book entitled, "The Propagation of Wild Birds," Mr. Herbert K. Job, Economic Ornithologist in Charge of the Department of Applied Ornithology of the National Association of Audubon Societies, has said, "The actual propagation of edible species for purposes of food or financial profit is receiving a great impetus these days, and is becoming an important industry. Wild Ducks and Pheasants are raised in large numbers for the market. Farmers and youths are beginning to propagate 'game' as a side line for profit, and in some cases add neat sums to their incomes. To supply the wide demand for breeding-stock people here and there are beginning to experiment with various species, often with considerable success. Such efforts will also help to extend the range and increase the numbers of these birds. Farmers can make it a source of revenue to protect or propagate game on their land either for purposes of sale or to lease out the hunting privilege." In going over the interesting pages of the book from which the quotation has just been given, I have been amazed at the evidences of progress that is being made along the lines of rearing many kinds of birds under special natural and artificial care. An entire chapter, and that not a brief one, is given to Quail propagation methods, and in this chapter it is clearly shown how the Bob-white may be reared in captivity, though it was once thought that this was impossible. In many places these birds are increasing rapidly in their native fields because of the adequate protection given them and in other places many are being reared by artificial process. It is very interesting to see, now-a-days, pictures in the various ornithological publications of great covies of Bob-whites that have been reared in this fashion. Some of the western Quail are propagated in the same manner. The Ruffed Grouse, that fine game bird originally so common among our West Virginia hills, is now being propagated in captivity. Of this species Mr. Job says, in the volume referred to above, "The wild, whirring creature of the forest, self-reliant through its constant battle with innumerable dangers, is hardly recognizable as the same when it learns to know man as a friend. It seems characteristic of birds of this family to be capable of most remarkable tameness, in contrast to the supposedly incurable wildness of their nature. From the standpoint of Applied Ornithology they form a unique and peculiarly interesting group. * * * * * * The general impression of the whole tribe, from the standpoint of artificial propagation,

is that Grouse are peculiar birds, rather difficelt to keep protractediy in confinement owing to peculiar habits, and particularly their decided liability to epidemic diseases." In the paragraphs that follow this one, Mr. Job speaks of his success and the success of others in rearing the captive Ruffed Grouse. The Wild Turkeys, various kinds of imported Pheasants, other imported game birds, many kinds of Ducks, Geese and Swans, as well as other kinds of wild birds are now artificially propagated with marked success, and the rearing of these birds bids fair to develop into a very profitable industry. This phase of Economic Ornithology is very important since it is quite possible that birds desirable for food may be so increased in numbers as to furnish large quantities of healthful and delicious meat to the general dietary.

Provide Nesting Sites.

It is said of Baron Von Berlepsch that when a boy in Germany, he "noticed that the bird-houses then put up for birds were seldom occupied, and he began to inquire the reason and to make careful studies and experiments in methods of attracting birds. These studies led to journeys all over the world. For years he has been carrying on experiments on his estates with surprising results. Of about 500 acres, 19 are in a park, 60 are laid out in thickets, and 400 are in woodland. There is also a lake which attracts water-birds. In an area of 12 or 13 acres of park upwards of 500 pairs of birds regularly nest, not including a colony of over 100 nests of house martins on a barn. About 300 nesting-boxes in the park are all occupied. In the woods there are about 2,000 boxes, of which about 90 per cent regularly have tenants." This is a striking illustration of what may be done in attracting the birds by providing them with proper feeding and nesting places. In many places in this country experiments somewhat similar to those of Baron Von Berlepsch are being carried on, though usually on a much smaller scale. In every case, so far as I know, good results have followed, and when nesting-boxes have been placed in proper positions for the birds they have come and occupied them. So interesting and helpful are the chapters in "Wild Bird Guests" by Ernest Harold Baynes, that I quote several paragraphs from his chapter on "The Bird Lover as a Landlord." His suggestions are as follows: "I doubt if it ever occurs to the average person that birds are actually in need of nesting sites. Of course there are thousands of people who believe that it is a good thing to encourage Bluebirds and Tree Swallows and Wrens by puting up nesting-boxes in the gardens and orchards, but most of them do it chiefly because it is interesting and delightful to have the birds about. A few go as far as to plant shrubbery in the hope that Catbirds and Song Sparrows and a few others will make their homes in it. But they rarely do this because they think the birds need it. As they look out over the country side and see all the trees and bushes, it seems as if the birds had far more nesting sites than they could possibly use and the fact that so many of these trees and shrubs are not used by the birds, seems to confirm the opinion. The chances are, however, that many of these apparently good nesting-sites are unused for the very simple reason that they are not what the birds

Upland pasture lands. Favorite nesting site of Vesper and Grasshopper Sparrows. Photo by Fred E. Brooks

require, and that they would not even appear to be suitable if we knew a little more about the real tastes and preferences of birds. Perhaps no other man has given so much good thought to this subject as Baron Hans Von Berlepsch, whose estate, "Seebach," near Essen, Germany, has become world famous as a paradise for birds. As a result of the study he has given to the likes and dislikes of his feathered guests in the matter of nesting sites, he has a thousand birds nesting on the twelve or thirteen acres immediately surrounding his castle, every year, and thousands more in the woods beyond. And it has paid him to study the comfort of his guests, for they have become a power for good. When an insect plague swept over that section of the country some years ago, "Seebach" was the one green spot left on the face of the landscape; it stood out like an oasis in the desert. And all because a thousand birds, with perhaps two thousand hungry babies to feed, showed that insect destroyers of vegetation can be made to serve a very useful purpose."

Destroying Harmful Species.

Among the tigers of India there are certain individuals which become man-eaters; among dogs there are certain individuals that acquire the habit of killing sheep; among Hawks and Owls there are some birds that have the habit of killing poultry and there are a few species that make poultry and game birds the chief part of their daily diet. As these criminals among birds and other animals are discovered they should be killed or otherwise disposed of. Some individuals among the Hawks and Owls become very destructive and should be dealt with accordingly. Other birds, too, beside the Hawks and Owls are harmful or at least partly so. Many of our very useful birds have harmful tendencies, and these should be restricted at various times and in a reasonable manner. Perhaps the only birds in West Virginia that really do more harm than good are the Cooper's Hawk, the Sharp-shinned Hawk and the English Sparrow. These two Hawks should be shot wherever seen destroying chickens or game birds, and other Hawks that may acquire this bad habit should be destroyed. Yet it must be remembered that we have useful Hawks as well as harmful ones and this should warn us not to encourage the indiscriminate slaughter of every kind of Hawk that may come within gun-shot. Only the two destructive species should be killed, though it is not illegal to kill the others. Perhaps our worst pests among the birds are the ever-increasing hosts of English Sparrows. It is not safe to poison them as is sometimes recommended. Useful species may be destroyed by the poison that is put out for the English Sparrows. Perhaps the best method of destroying these alien birds is to tear down their nests. Persistent efforts along this line will result in lessening greatly their numbers. When the Sparrows have formed the habit of eating the young pea vines in the garden they may be caught by baiting the ordinary mouse-traps with bread crumbs and setting them out for the birds. I have destroyed them in considerable numbers in this way. Of course they may be driven away by shooting. It is time that all possible methods were used for their destruction since they are a great pest and drive away many of our own native birds.

Nest of Duck Hawks on the "Devil's Nose", Morgan County, West Va.
Photo by Fred E. Brooks

CHAPTER IV.

HAWKS, OWLS AND VULTURES.

Birds of Prey.

The carnivorous, or flesh-eating, birds are called birds of prey. Their food consists almost altogether of animal matter of some sort, the Hawks and Owls feeding upon mammals, birds, reptiles and insects which they catch in swift flight and kill with powerful beak and talons, and the Vultures feeding upon decaying animal matter. In our State we have a good representation of the Hawk and Owl families, but only one Vulture, the Turkey Vulture. The economic value of these birds has been discussed briefly in a previous chapter, and it remains now only to look a little more carefully to the food habits of these birds whose status is so often called in question.

The Vultures.

Only three species of Vultures are found in North America, and only one in West Virginia. This is the well known and very useful Turkey Vulture, or "Turkey Buzzard." In all that great section of the State that lies east of the mountains this species is very abundant, and, on a summer day, one can scarcely glance upward without seeing one or more of these graceful birds flying in lazy circling manner high overhead. Sometimes scores may be seen at one glance . I have seen almost a hundred at one time, as they gathered around the carcass of some dead animal or assembled in great flocks after the nesting season. One morning, about the 20th of August, 1914, Mr. King and I counted ninety-one of these great birds in two trees in a field near Scherr, Grant County. A little earlier in the same month I visited the nesting site of a pair of these birds in the rugged mountain region along the Great Cacapon River in Morgan County. In the central and western parts of the State these birds are rather rare, much more so than formerly. Along the Ohio River they are exceedingly rare. Their food consists mostly of carrion and other refuse matter. Of course, so far as they act as scavengers, their feeding habits are altogether beneficial. In some places the work of Vultures is almost indispensable to the comfort and health of the community. However, this charge has been raised against them that they scatter, from one locality to another, the germs of hog cholera and other infectious diseases from which domestic animals die. If this be true, and there is good evidence that it is true, these birds may be capable of doing great harm in spreading contagious diseases from one neighborhood to another as they travel about on their strong wings in search of food. Yet I do not believe that these birds ought to be condemned until more evidence is gathered along this line, and I am sure they should be protected carefully because of their help in promoting general cleanliness.

The Hawks and Eagles.

Our catalogue of West Virginia Hawks and Eagles includes sixteen species. These are all birds of considerable size, the smallest being the Sparrow Hawk and the largest being the Eagles. Some of these species, such as the Swallow-tailed Kite, Goshawk, Swainson's Hawk, Golden Eagle, Bald Eagle and Pigeon Hawk, are exceedingly rare; three others are not seen very often—the Rough-legged Hawk, Duck Hawk and Osprey or Fish Hawk; while the others are usually quite common. The seven more common species, the Marsh Hawk, Sharp-shinned Hawk, Cooper's Hawk, Red-tailed Hawk, Red-Shouldered Hawk, Broad-winged Hawk and Sparrow Hawk, ought to be studied very carefully. It is a common custom among farmers' boys, hunters and every one who is permitted to carry a gun to shoot Hawks indiscriminately and to execute summary vengeance upon every bird that belongs to this family. This may be legal, but it is wrong. In this entire family, so far as it is represented in West Virginia, there are only three really harmful species. These are the Sharp-shinned Hawk, Cooper's Hawk and Goshawk. As has been said, the Goshawk is very rare. These three species are slender, swift-winged birds, sometimes known as "Blue Hawks" because of their bluish-gray colors. They are often called "Chicken Hawks" because they are the most destructive of all the Hawks that frequent our poultry yards. When these three destructive species can be distinguished from the beneficial species they should be shot, but it is bad economy to shoot many of our helpful Hawks for the sake of getting rid of a comparatively few harmful ones. That large Hawk which we so often see sailing high in the air in slow and graceful curves, the bird that we commonly call "Hen-Hawk," is the Red-tailed Hawk. The appropriateness of this name may be seen by a glance at the tail of the male bird. Of this species Dr. A. K. Fisher, our best authority on the food of the Hawks and Eagles, has said, "While fully 66% of the Red-tails' food consists of injurious mammals, not more than 7% consists of poultry, and it is probable that a large proportion of the poultry and game captured by it and the other Buzzard Hawks is made up of old, diseased or otherwise disabled fowls, so preventing their interbreeding with the sound stock and hindering the spread of fatal epidemics." Dr. Fisher further says, in his *Hawks and Owls of the United States*, that "Of 562 stomachs examined by the author, 54 contained poultry, or game birds; 51, other birds; 278, mice; 131, other mammals; 37, batrachians and reptiles; 47, insects; 8, crawfish; 13, offal; and 89 were empty." By this it may be seen that not more than 10% of the food of these large Hawks is made up of poultry and game birds. Many obnoxious mammals are destroyed by them. The little, varicolored Sparrow Hawk may be taken as an illustration of the good done by certain members of this family. Though its name may seem to indicate that it lives on some of our useful American Sparrows, the truth of the matter is that not more than 16% of the food of this Hawk is made up of our small wild birds. During the summer it feeds largely on such insects as grasshoppers, crickets and spiders, and in the winter it subsists largely on mice. When Dr. Fisher examined 320 stomachs

Photo by Fred E. Brooks

Cliff of rocks in which Duck Hawks nest.

he found that 215 of them contained insects. Strange as it may seem many of our agriculturists are not willing to count the almost inestimable good that these birds do when they remember that some members of the Hawk family have the bad habit of killing a few birds or chickens. The Marsh Hawk should not be forgotten in a survey of this family since it does great good in destroying large numbers of meadow mice in the fields over which it delights to hunt. The Broad-winged Hawk is another species that catches large numbers of mice, other mammals and insects. It is not so common as some of our other Hawks, yet along the base of Black Mountain, in Pocahontas County, I have found numbers of these birds. The other rare Hawks, mentioned above, need not be discussed for they are so few in number as to make them of little economic importance.

The Owls.

Like the Hawks the Owls are under the ban of public opinion and suffer death from every boy who goes out hunting. Only the other day I saw a fine Barred Owl lodged in the top of a great tree where he had been shot by a reckless gunner. In our State we have eight kinds of Owls. They are the Barn Owl, Long-eared Owl, Short-eared Owl, Barred Owl, Saw-whet Owl, Screech Owl, Great-horned Owl and Snowy Owl. Of these the Long-eared, Short-eared, Saw-whet and Snowy are very rare and not one of the four has been reported more than three times from all localities in West Virginia. The Short-eared Owl and Long-eared Owl are two species of moderate size; the Saw-whet Owl is a diminutive northern species that has been found a few times along the higher Alleghenies in winter time. My most authentic record was made by Charles O. Handley at Lewisburg on Dec. 26, 1914. The Snowy Owl is a large white bird that has been found a very few times within our borders. Not long ago in reading the works of Alexander Wilson, one of our greatest American ornithologists, I found this interesting record in the story of a trip down the Ohio River made a few years ago, and containing several references to the Snowy Owl—"At a place on the Ohio called Long Reach I examined another bird which was the first ever recollected to have been seen there." Of the more common Owls, the Barn Owl is the most rare, but the others are found in great abundance. The little Screech Owl, in its two color phases, is very common throughout our State. Of this bird Dr. Henshaw says, "Out of 324 stomachs examined, 169 were found to contain insects; 142, small mammals; 56, birds; and 15, crawfish. The Screech Owl should be encouraged to stay near barns and outhouses, as it will keep in check house mice and wood mice, which frequent such places." The Great-horned Owl is common in all parts of our State though less so in the mountains. Of all our birds, with the possible exception of the Sharp-shinned Hawk and Cooper's Hawk, the Great Horned Owl is most destructive to poultry. Since this bird is so large and strong even turkeys are taken, and this bird is one of the worst enemies of the Wild Turkey. In the mountains the Barred Owl is the most abundant member of the family. In camping out in many sections of this State I have frequently

heard some of the startling calls of this weird bird of the night. Occasionally I have heard its short, sharp hoot in the day time. Like the other Owls the Barred feeds largely upon small mammals and insects. In the region of the Cranberry Glades, Pocahontas County, I, with the help of others, have carried on very interesting ecological studies. Since this glady region abounds in cranberries and other small fruits that grow on or near the ground many mice and other small mammals are there in large numbers. These small mammals attract the Owls, and they are most noticeably abundant throughout all that section. Many a time have I heard the cries of Owls during the night as I have slept out around the edge of these glades. Wherever mice and other small mammals abound the Owls are present in large numbers. Owls, contrary to public opinion, should be carefully protected, with the possible exception of the Great Horned Owl. The others are rather useful than harmful, some of them being most beneficial.

CHAPTER V.

BOBWHITE, GROUSE AND WILD TURKEY.

Game Birds.

We are particularly interested in some of our birds because of the food they eat, but our interest in the Game Birds arises from the food they supply. The group of Game Birds affords an illustration of the manifold usefulness of birds. Though other species are of untold utility because of their help in combatting some of the plagues of the agricultural world, these fine birds help in a more direct way to supply our food by furnishing their own flesh. The time was, not many years ago, when the wild game birds and mammals contributed very largely to the larder of the pioneer settlers in this country. I have heard persons say that they could remember very well the time when so many Wild Turkeys were brought in at the end of a little hunting trip that the entire family could not make use of them. Only a few generations ago wild game of many kinds abounded in this part of the country. With proper protection and care our Game birds might become very common once more, and furnish much pleasure to the hunter and food to the hungry. Our thousands of acres of rough untillable land here in West Virginia furnish ideal conditions for the natural propagation of our native Game Birds. In so many sections there are now large tracts of mountain land that have been cut over by lumbermen or burned over by forest fires. In these places tangles and dense thickets of shrubbery and vines are springing up. These afford good shelter, refuge and food for these birds. If we can hereafter control our forest fires, especially in the spring when the Wild Turkey and Ruffed Grouse are nesting, if we can control some of their natural enemies and fine or imprison some of their human enemies till they learn the lesson of game protection, these birds will increase rapidly and become quite common once more. West Virginia should bcome a veritable paradise for Game Birds, and, no doubt, with the enforcement of our laws, an awakened public conscience and educated public sentiment, these birds may yet be saved from extinction in our forests and may become almost as common as in other years.

Bob White.

There is, perhaps, no bird in all America more generally known than the attractive and beneficial Bobwhite. As a game bird it is without a peer. Though small in size it is quite abundant when properly protected, and its flesh is one of the favorite foods of the epicurean. It might be a provident source of food for all the people if it were allowed to increase as nature would have it. That my readers may know the great value of this little Game Bird I quote at some length from Harold Baynes' new book, *Wild Bird Guests*. In his chapter on the Economic Reasons for the Protection of Birds Mr. Baynes says, of the Bobwhite, "They are wonderful destroyers of potatoe bugs, and if encouraged to

nest in the fields and fence corners, no Paris green need be used on the potato crops. On locusts they work just as well. Professor Aughey found in the stomachs of twenty-one quail, 539 of these insects, an average of twenty-five apiece, and that only a part of one day's work. These birds also eat large numbers of chinch bugs, cotton worms, cotton-boll weevils, cucumber beetles, May beetles, leaf beetles, clover-leaf beetles, corn-hill bugs, wire worms, cutworms, ants, flies and many other insect pests. And being birds of good size they require large quantities of such food. As destroyers of weed seeds they stand as high if not higher. Forbush states that they eat the seeds of over sixty different kinds of weeds, those of ragweed seeming to be the favorite. The same authority tells us that 'as many as two or three hundred seeds of smartweed, five hundred of the red sorrel, seven hundred of the three-seeded mercury, and one thousand of the ragweed have been eaten at a meal.' Dr. Judd gives even stronger testimony in favor of these birds when he tells us that five thousand seeds of green foxtail and ten thousand of pigweed have been found in a single bird. He estimates that from June 1st to August 1st in the two states of Virginia and North Carolina alone, bobwhites eat 1341 tons of weed seeds and 340 tons of insects. When to all this is added the aesthetic value of this gentle bird, whose cherry voice thrills all to whom it is familiar, we see that to kill a quail and serve it on toast is to realize but a very small part of what it is worth."

Ruffed Grouse.

Several kinds of Grouse are to be found in various parts of this country, but only one occurs within the limits of our State. This is the Ruffed Grouse, called "Pheasant" by many West Virginians and "Partridge" by persons from farther north, though this last name is usually applied to the Bobwhite in this section. Like our other Game Birds the Ruffed Grouse has decreased greatly in numbers during the past few years, though it may be found in most localities throughout the State. Along the Ohio Valley this species is very rare, but in the hilly region, the plateau and mountain regions of West Virginia it is rather common, where there are extended forests. The flesh of this bird is of excellent quality, and is much sought for by those who prize such delicacies. Of its food Ernest Thompson Seton says, "The food of this Grouse is largely insects and berries during the summer; in the autumn it adds seeds to the list, and when the ground is covered with snow the staples are catkins, leaves, and buds." About the glade regions of West Virginia this Grouse is often found feeding among the alders and the ground hemlocks that are found along the edges of the great swamps.

Wild Turkey.

Frank M. Chapman speaks of the Wild Turkey as "the noblest of American birds." Those who have seen this fine bird in his native forests are willing to testify to the correctness of this estimate. No more splendid bird is found anywhere in all our country than the

Wild Turkey. It is the Game Bird par excellence. In some places in West Virginia flocks of considerable size may yet be found, and in a few localities it is really quite common. However, in most places it is approaching extinction, and, if it is not carefully protected in the coming years, all will be gone from the entire State. In some places the Wild Turkey is being propagated artificially with considerable success, and in other places their numbers are being greatly augmented by setting aside forest reservations and making game preserves, in establishing a closed season for this species and in ridding the country of their natural enemies. Forest fires do much to deplete the number of Wild Turkeys, since their eggs are often destroyed in this way. The food of the Wild Turkey is much the same as that of the domesticated species and consists in large measure of grasshoppers, cicada and other large insects and of grain gathered up in cut-over harvest fields, but the chief economic value of this bird consists in the supply of excellent food which it furnishes the hunter.

Photo by Charles O. Handley

Male Flicker near nest.

CHAPTER VI.

THE WOODPECKERS.

Woodpecker Characteristics.

Of this large family of highly specialized birds Mr. Frank M. Chapman, in his very valuable and comprehensive book, *Hand-Book of Birds of Eastern North America*, says, "Woodpeckers occur in all wooded parts of the world, except in the Australian region and Madagascar. Some three hundred and seventy-five species are known, of which about one-half are confined to the New World. Twenty-four of this number are found in North America. Woodpeckers are rather solitary birds, but are sometimes found associated in scattered companies during their migrations. Above all other birds they are especially adapted to climb or creep. The peculiar structure of the foot, with its two toes directed forward and two backward (except, in North America, in one genus), assists them in clinging to an upright surface, while the pointed, stiffened tail-feathers serve as a prop. The stout, chisel-like bill of the more typical species is used to cut away wood and expose the hiding-places of grubs, etc.; then the long, distensible tongue with its horny, spear-like tip, is thrust forward, the food impaled and drawn out. The vocal powers of Woodpeckers are supplemented by the bill which is used to beat the long, rolling call forming their love-song." In West Virginia we have at least seven species of these arboreal birds. It is possible that one or two other members of this family may yet be discovered within our State. Those that have been observed are the Hairy Woodpecker, Downy Woodpecker, Yellow-bellied Sapsucker, Northern Pileated Woodpecker, Red-headed Woodpecker, Red-bellied Woodpecker and Northern Flicker. While in many respects these birds resemble one another very closely, in some respects they are quite diverse. The Flicker, for instance, feeds largely upon the ground; the Red-headed Woodpecker takes most of its food in the air in true Flycatcher fashion; the Yellow-bellied Sapsucker punctures the bark of many kinds of forest and cultivated trees, feeds on the cambium, drinks the sweet juices that flow from some of the punctured trees, and catches the insects that come to drink the fermented juices; while the other species depend largely upon the insects which they dig out from the limbs and trunks of trees. The Woodpeckers have been called the carpenters of the woods, and the name is appropriate because with their chisel-like bills they drill deeply into solid or decaying wood and extract the larvae and other insect forms that are lurking there doing their quiet work of destruction. Many persons look upon the Woodpeckers with some suspicion since they are often seen puncturing trees, eating fruit and doing other things that may easily be construed as harmful. However, we are not to judge by appearances, but by the facts that have been carefully gathered by investigators trained to their work. After examining many stomachs of birds belonging to this family, the Biological Survey at Washington has found that they devour many wood-boring beetles, both adults and larvae, caterpillars and ants. As may be seen

in the notes that follow, some species do harm, but, as Prof. Beal says, "These birds are certainly the only agents which can successfully cope with certain insect enemies of the forests, and, to some extent, of fruit trees also. For this reason, if for no other, they should be protected in every possible way."

Downy and Hairy.

Two of our smaller Woodpeckers are very similar and can be distinguished only with careful observation. These are the Hairy and Downy. The former is the larger of the two and in most sections by far the rarer, though in certain mountain sections of our State I have found the Hairy Woodpecker to be the most common member of the family. The Downy is to be found everywhere throughout the State, common in the great forest sections, the farming regions and in villages and towns alike. It is not at all strange to see a Downy Woodpecker quite at home in the shade trees along a busy street. The food of these two species consists of such insects as they gather from under the edges of the outer bark of trees and from the wood into which they make their excavations. I have examined apple trees where the Downy had been working and found many scales of the outer bark that had been punctured by these little Woodpeckers in their search for the pupae of the codling moth. Many of these injurious insects are destroyed in this way. Both the Downy and the Hairy eat wood-boring grubs, caterpillars, beetles, ants and many other insects that are found about the trunks and limbs of trees. In her interesting little book on the Woodpecker family Fanny Hardy Eckstrom says, "Downy works at his self-appointed task in our orchards summer and winter as regular as a policeman on his beat. But he is much better than a policeman, for he acts as judge, jury, jailer, and jail. All the evidence he asks against an insect is to find him loafing about the premises."

Yellow-bellied Sapsucker.

During my years of study of the birds of West Virginia I have gathered voluminous notes on the Yellow-bellied Sapsucker. This is a rather obscure member of the family, yet its work is much in evidence. Practically every apple treee in our orchards shows punctures made by these birds, and many of the forest trees have been marked in the same way. This species occurs as a migrant in most of our State appearing only for a little while each spring and fall. High up in the mountains I have found it breeding in the summer. At several points I have found these birds nesting, and there is no doubt that they nest quite generally throughout all the higher ranges of the Alleghenies. From many points of view this Woodpecker is important economically. In the first place it is known to destroy many forest and orchard insects. I have seen this bird capturing insects that had been attracted to the punctures in trees that the bird had made, by the flowing of the sweet juices. Then, too, this species destroys some trees and does not a little damage by the punctures it makes. Dr. A. D. Hopkins, who has made a special

study of the effect of this bird's work on the trees which it punctures, says that the bird's-eye effect in our maples and in some other forest trees is caused by the punctures of these birds. He has proven this point very conclusively, and, since this is true, the increased value of the lumber that has these beautiful bird's-eye markings goes far to make up the loss caused by the punctures in some other trees. Dr. Hopkins found in West Virginia about twenty-five kinds of forest trees that had been punctured by these Sapsuckers. In a recent article on this bird Dr. Henry W. Henshaw, Chief of the Biological Survey, Department of Agriculture, has said, "The regular girdles of holes made by this bird are common on a great variety of trees; in all about 250 kinds are known to be attacked. Occasionally young trees are known to be killed outright, but more loss is caused by stains and blemishes in the wood which result from Sapsucker punctures. These blemishes, which are known as bird pecks, are especially numerous in hickory, oak, cypress, and yellow poplar. Defects due to Sapsucker work cause an annual loss to the lumber industry estimated at $1,250,000. The food of the Yellow-bellied Sapsucker is about half animal and half vegetable. Its fondness for ants counts slightly in its favor. It eats also wasps, beetles (including, however, very few wood-boring species), bugs and spiders. The two principal components of the vegetable food are wild fruits of no importance and cambium (the layer just beneath the bark of trees). In securing the cambium the bird does the damage above described. The Yellow-bellied Sapsucker, unlike other Woodpeckers, thus does compartively little good and much harm."

Red-headed Woodpecker.

The bird that attracted Alexander Wilson's attention to the birds of America, soon after he came to our shores, was the Red-headed Woodpecker. This is a bird of striking colors, and is a familiar species throughout the State. Like some other members of this family he has been accused of destructive habits of some of which he is guilty. The Red-headed Woodpecker sometimes injures telephone poles by drilling large holes in them for nesting purposes; he is very fond of the early sweet cherries and does not hesitate to lay heavy toll on them in return for the good services he does at other times in the year; and he sometimes destroys or at least injures, the maturing corn, attacking it when it is "in the milk," and for this purpose opening a large percentage of the ears of corn in the fields where it makes its devastations. Nuts are also eaten by this Woodpecker, though not to a harmful extent. To counterbalance this harm done, this bird destroys many beetles, grasshoppers and other insects. Most of these are taken on the wing in real Flycatcher fashion.

The Flicker.

Another important member of this family is the Northern Flicker. In different localities in this country this bird bears different names. Among those that are in most common use are, "Yellow Hammer,"

"Golden-winged Woodpecker," "Partridge Woodpecker," "High-hole" and "High-holder." Throughout West Virginia the name in most common use is "Yellow Hammer." Often as one walks along the paths in an old field he may be frightened by the sudden fluttering of wings as a Flicker flies up from the ground where he has been gathering his food. As every observing farmer's boy has learned, the "Yellow Hammers" feed largely on the ground where they gather great quantities of ants and other insects. It has been found that fully 45% of the food of this bird consists of ants. Some wild fruit is eaten and, occasionally, cultivated varieties are taken. Mrs. Florence Merriam Bailey says in her interesting pamphlet entitled *How Birds Affect the Farm and Garden*, "Nearly half of the food of the Flicker is ants. Three thousand were found in one stomach. As ants spread plant lice, destroy timber and infest houses, the Flicker is certainly a useful bird. It does good work in other ways also. Like many innocent birds, the Flicker has been accused of corn-eating, but only five out of 230 stomachs contained corn. Prof. Beal, having spoken of the good work the Woodpeckers did in Newbraska at the time of the Grasshopper devastation, says of the Downy, Hairy and Flicker: 'Not one of the trio shows a questionable trait, and they should be protected and encouraged in every possible way.'"

Photo by Charles O. Handley

Cranberry Glades where Alder Flycatchers nest.

CHAPTER VII.

NIGHTHAWKS, SWIFTS AND FLYCATCHERS.

Some Aerial Species.

The Nighthawks, Swifts and Flycatchers are all more or less aerial and take their food on the wing. The first two families are very distinctively birds of the air, and spend most of their time flying about. Three members of the Nighthawk or "Goatsucker" family are found in West Virginia. They are the Nighthawk, Chuck-will's-widow and Whip-poor-will. These birds are peculiarly well adapted to their work as insect hunters, their mouths being very capacious, their gullets large, and their stomachs enormous. They take their food on the wing. The Chimney Swift, our only representative of the Swift family, spends practically all its time in the air and is a great destroyer of harmful insects. The Flycatchers, a large family of birds that is well represented in our State, are also insectivorous and take their food as they fly hurriedly through the air in pursuit of their fleet-winged prey. These families will be described in the paragraphs that follow.

Goatsuckers.

The Goatsuckers, as the family of Nighthawks and Whip-poor-wills is sometimes called, are large birds with strong wings and an almost inexhaustible capacity for their insect food. While few in number of species, they are many in number of individuals, though one of our species, the Chuck-will's-widow has been found but once in the State. It is a rare southern bird and does not venture far north. The other two species are very abundant, the Nighthawk exceedingly so. The Whip-poor-will's call is heard almost every where in West Virginia in those months when they are present with us. During the first week in May the Nighthawks arrive from the south, though they are not often seen in large numbers in the spring, a few remain in our mountain sections to breed, though most of them go farther north. About the middle of August these birds begin to fly toward the south. Then may be seen immense flocks of these very graceful birds as they fly about in pursuit of their food. At that season of the year they are sometimes called "Bull Bats" because of the coarse, raucus note that they utter, though this booming note is heard most often in the spring. Prof. Forbush says, "It is probable that the Nighthawk is one of the most useful of all birds. It ranks next to the Flicker in the destruction of ants, and it takes them when they are flying and about to propagate. Professor Beal estimated that the stomachs of eighty-seven Nighthawks which he examined 'contained not less than twenty thousand ants, and these were not half of the insect contents.' One Nighthawk's stomach held remains of thirty-four May beetles. Great numbers of grasshoppers are caught by these birds. Potato beetles, cucumber beetles, leaf hoppers, bugs, and enormous quantities of gnats and mosquitoes have been found in their stomachs. Nighthawks are absolutely harmless, as they never

take fruit or grain, grass or vegetables." All these birds are animated insect traps, and do an untold amount of good in taking the aerial forms of insect life. They should be carefully protected, and every one who shoots a Nighthawk, as is often done, should be prosecuted to the full extent of the law.

The Chimney Swift.

Flying through the air in the summer time, from about the 20th of April to the first week in October, may be seen great numbers of small, bow-shaped birds, twittering as they fly. These birds are often known as "Chimney Swallows." However, this is a misnomer. The birds are not Swallows and should not be given that name. They belong to the Swift family and differ anatomatically from the Swallow family. All summer long they gather in small flocks about chimneys in the towns, cities and farming communities and there they build their nests, fastening them to the chimney walls. In undeveloped communities they often make their nests in old trees, and in 1914 I found these birds building their nests on the walls of an old shanty in a lumber camp. Because of their great numbers and their restless activity they destroy great numbers of small insects. In every respect the Chimney Swifts are useful birds.

Flycatchers.

Another interesting family belongs in this chapter. This is the family of Flycatchers which includes certain species like the Phoebe and Kingbird with which every one is familiar. In our State at least nine species and subspecies have been found. These are the Kingbird, Crested Flycatcher, Phoebe, Olive-sided Flycatcher, Wood Pewee, Yellow-bellied Flycatcher, Acadian Flycatcher, Alder Flycatcher, and Least Flycatcher.

The name that most of these birds bear is indicative of the character of, and the manner of procuring, their food. These birds are almost wholly insectivorous, though a few of them eat fruit in considerable quantities in late summer and autumn. I have always felt a very special interest in this family. Though inconspicuous and, as compared with many other birds, rather somber in coloring, they have habits that are attractive and their characteristics are so exceedingly varied as to make them a most delightful group for study. In taking up these different species for study and investigation, we shall find them one of the most interesting of all our families of birds. The Kingbird is a bold, dashing species with very dark gray back, black head and tail, the tail being banded across the end with white and a patch of orange concealed by the outer feathers of the crown, the under parts being white. This bird is often called "Bee Bird" or "Bee Martin" because of its fondness for honey bees. It is true that the Kingbird often takes bees, but this destruction is not so greeat as is sometimes thought since more drones are killed than workers. They are of real value to the apiary on account of the destruction of moths and other insects. Of the bee-eating habit of the Kingbird, Prof. Beal says, in one of the bulletins of the Biological

Survey, "The Biological Survey has made an examination of 281 stomacks collected in various parts of the country, but found only 14 containing remains of honeybees. In these 14 stomachs there were in all 50 honeybees, of which 40 were drones, 4 were certainly workers, and the remaining six were too badly broken to be identified as to sex." In my studies I have found evidences that these birds destroy many harmful insects, and that they help the farmer by driving the Hawks away from the poultry yard. They also eat many kinds of fruits, and I have seen them feeding upon the mulberry, blackberry, raspberry, *Ilex mollis* (holly), wild prickley gooseberry, common elder berry, and sassafras. During the last days of August, 1915, I found a flock of about 75 of these birds feeding in a large grove of sasasfras bushes. They ate large quantities of these aromatic berries, swallowing them whole, then casting out the seads from the tops of nearby trees into which the birds flew after gorging themselves with the fruit. The Kingbird is common in most parts of our State, especially so in the southeastern section. The Crested Flycatcher is another species that is worthy of mention, and its food habits should be studied very carefully. It is one of the largest members of the family, having a rich brown back, light gray throat and breast and sulphur yellow belly. Usually these birds are to be found in the woods, but occasionally they come out into our orchards and vineyards. The food of this species consists of woodland insects and a little fruit. Last August I found the Crested Flycatcher feeding on the ripe fruit of the sassafras. In Bulletin No. 110 of the West Virginia Agricultural Experiment Station Mr. Fred E. Brooks says, "One of the vineyards in which the study of the grapevine root-borer was carried on extended along the side of an orchard of pear trees. These trees, at the time the moths were flying, seemed to be a favorite rsort for a family of Crested Flycatchers, and several times these birds were seen hawking among the grape vines. On the morning of Aug. 1, one of the Flycatchers was observed to leave the top of a pear tree, catch some insect that was flying near the grape vines, and then return to the tree. This procedure was repeated several times, when the bird was shot and an examination made to ascertain what insects it had been catching. This bird proved to be a young female and its stomach contained seven of the root-borer moths, and one large grasshopper, all of which had been recently swallowed. Two of the moths were females, and these two contained 416 eggs which could be counted. If this one examination indicated any thing like the extent to which these Flycatchers were feeding upon the moths, then the bird must be, in that locality at least, a very important factor in reducing the number of borers. The seven moths had supplied only a breakfast for the bird, and if the same rate of feeding were kept up for a day by the five or six Flycatchers that frequented the vicinity of the vineyard, not less than a hundred moths would be consumed. It can therefore be seen that any condition favoring the presence of these, as well as other insectivorous birds, about a vineyard is greatly to be desired."

"Among our early spring arrivals here in West Virginia is the Phoebe, or "Pewee," as it is familiarly called. This bird becomes semi-domestic

about our homes and other buildings where it places its nest on any sort of a projection that will support this compact structure of moss, mud, grasses and hair. The Phoebe is insectivorous and destroys many click beetles, May beetles, weevils, grasshoppers, flies and bugs. Since these birds raise at least two broods each season, and each brood has from four to six young, there are many hungry mouths to fill and the insects required for the young greatly diminishes the insect population in the vicinity of the nesting place. I have found this species feeding on the fruit of the black mulberry, service berry, holly, common elder berry, sassafras, wild black cherry and Virginia creeper.

Of the other Flycatchers the Wood Pewee is most common. The Yellow-bellied Flycatcher is very rare and the Olive-sided Flycatcher is found only in our highest mountains. The Acadian Flycatcher is common along streams and is a persistent foe of insects. The Least Flycacher and the rare Alder Flycatcher are found only in our mountain sections during the summer; during the migration seasons they may be found elsewhere. A few years ago I made the most southern record of the nesting of this species when I found them breeding in the Cranberry Glades in Pocahontas County.

Photo by Fred E. Brooks

Nest of Meadow Lark, French Creek, W. Va.

CHAPTER VIII.

BLACKBIRDS AND SPARROWS.

General Characteristics.

The family of Blackbirds, Orioles, etc., includes the true Blackbirds, the Meadowlark and the Orioles. So far as appearances go this is a very miscellaneous group, yet the anatomical structure of these birds is so much alike, though outward appearances are very unlike, that systematists have placed in the same family the gorgeous Orioles, the somber Blackbirds, the rollicking Bobolink and the terrestrial, sparrow-like Meadowlark. In West Virginia ten members are comprised in this family. They are the Bobolink, Cowbird, Yellow-headed Blackbird, Red-winged Blackbird, Meadowlark, Orchard Oriole, Baltimore Oriole, Rusty Blackbird, Purple Grackle and Bronzed Grackle. Several of these birds will be described in the paragraphs that follow.

The large and useful family of Sparrows also must be considered in this chapter. Aside from the English Sparrow we have in West Virginia thirty species of native Sparrows. These are nearly all very hardy birds, most of them of very dull colors, and many of them possessing great musical ability. All have strong conical bills with which they can crush the hard covering of seeds and grains. Their diet is made up of seeds, grains, fruit and insects. In some species the bulk of the food consists of insects, while others feed largely upon seeds. The Sparrow family is of very general distribution, and everywhere one goes many species are to be found. While some of these birds are fond of the woodlands, and a few are to be found in trees, the larger proportion of the family spend their time on the ground in the open fields or in the thickets. Few birds have a more important place in nature's economy than the family of Finches and Sparrows. This will appear as we discuss the food of some of the more important species.

Blackbirds.

Six species of Blackbirds have been recorded in West Virginia. One of these, the Yellow-headed Blackbird, has been taken but once. It is a western species and may never again be found in our State. The Red-winged Blackbird is a very common species wherever there are large meadows, swamps, glades or sluggish streams. In many places within our boundaries this bird is very common and may be seen in immense flocks in the migration seasons and in considerable numbers in its favorite nesting places in summer time. The male may be readily identified by his glossy black plumage and the brilliantly red and yellow shoulder spots. The female is dull brownish gray in color and is very inconspicuous. Grave charges of destroying much grain have been brought against this bird. It is true that the Red-wing is fond of certain kinds of grain, oats particularly, and wheat and corn are often eaten. Yet it has been proven that 57% of the whole year's fare for the Red-wing is made up of weed-seeds and that many harmful insects, weevils especially, are destroyed by this bird. In the month of June 25% of

CHIPPING SPARROW

Order—PASSERES
Genus—SPIZELLA
Family—FRINGILLIDÆ
Species—PASSERINA

National Association of Audubon Societies

this Blackbird's food is made up of snout beetles or weevils. The Rusty Blackbird is another species that needs only to be mentioned. This species is from the north and passes through the State on its migration journeys. At times I have seen these small Blackbirds in considerable numbers. Like the other smaller species of this family they feed largely on weed seeds. The two remaining species in the group, the Bronzed Grackle and Purple Grackle, are often called indiscriminately "Crow Blackbird." These two forms of the same species are found throughout the State, the Purple Grackle east of the mountains and its subspecies, the Bronzed Grackle, west of the mountains. To the untrained eye the two forms seem to be exactly alike and, so far as their habits and general appearances go, they are practically identical. These are our largest Blackbirds and their economic relationships are of importance. At times they appear in immense flocks of many thousands of birds. Prof. Beal says, "It is evident that a bird so large and so abundant may exercise an important influence upon the agricultural welfare of the country it inhabits." During the past summer I have seen the Bronzed Grackles feeding upon wild mulberries, black berries, wild black cherries and the fruit of the flowering dogwood. I have observed them feeding also upon beechnuts and several kinds of acorns. Sometimes they alight in the top of tall white oak trees and eat great quantities of the ripening acorns. Grain constitutes nearly half of the entire amount of food eaten throughout the year. Much of this that is taken in the winter is, of course, waste grain, but that taken in summer is from the fields where these birds alight in large flocks and sometimes do great damage. The food of this species is made up of many things—grain, weed seeds, wild fruit a very little cultivated fruit, grub worms and other harmful insects, snails, crayfish, salamanders, birds' eggs, young birds, mice, small snakes, fish and almost anything else that any bird will eat. The Bronzed Grackle and Purple Grackle are decidedly omnivorous. While they do some harm in the destruction of grain and a few birds' eggs, they do great good in the destrucution of many harmful insects. I believe these Blackbirds should be protected.

Bobolink.

The Bobolink should be mentioned because of its beauty of plumage, its exquisite song and its great reputation along various lines, though this species is quite rare in West Virginia. I have observed Bobolinks in a dozen or more sections of the State, seeing them usually about the first week in May. Mr. I. R. Tannehill says that "The Bobolink remained in the fields about Alderson until well into the summer, I believe about the 10th of June (1913.)" Large flocks have been observed in the eastern part of the State during the fall migration. So rare is this noted species in our part of the country that it need not be discussed from the standpoint of its food.

Meadowlark.

As we walk through the fields we occasionally flush from the ground

a rather large bird about the size of a Bob-white and having some of the marks of this bird. But its prominent white tail-feathers, the sharp metallic twitter which it utters frequently as it goes on its peculiar flight, and the fact that it ofteen alights on a fence, tree, or stump serve to distinguish it from the famous game bird which it resembles in some respects. This bird, the Meadowlark, is quite common in West Virginia. Even in mid-winter these birds may be found. As has been said, they are like the Bob-white in color, though the throat and breast are a beautiful bright yellow set off with a black crescent. Since these birds feed on the ground it may be inferred that they eat such insects and grains and weed seeds as may be gathered there. This is true, and it is has been proven by the examination of stomachs that this bird is almost wholly beneficial. One stomach examined by the experts in the Biological Survey at Washington contained fragments of 37 grasshoppers. In the grasshopper month, August, the Meadowlarks live almost entirely upon these destructive insects.

The Orioles.

The Orioles are chiefly noted for their beauty of plumage, their pleasing songs and their hanging nests. Though Orioles are quite abundant in the warmer sections of America, we have but two species in West Virginia. These are the Orchard Oriole and the Baltimore Oriole. The former species is not at all rare, though few persons have observed it on account of its retiring ways and inconspicuous manners. The song of the Orchard Oriole is very pleasing and its plumage is rich and varied. The adult male in full plumage is a deep chestnut red with black head, throat, wings and tail. The younger males and the females are yellow with olive-green backs and tails, and fuscous wings. The young males have black throats. The food of this species consists of insects and fruit. During the past season I observed the Orchard Orioles feeding upon sweet cherries, wild mulberries and service berries. Our other species, the namesake of Lord Baltimore, is well known because of the exceedingly brilliant plumage of orange, black and white. The females have the same color pattern as the males, but are far less brilliant. Along all our West Virginia streams this bird may be found, especially where the elm and sycamore trees grow. It is common also about orchards and in the shade trees in our cities and towns. The food of this beautiful species consists of insects, a small amount of cultivated fruit, wild fruits of several kinds, and a few green peas. Out of 113 stomachs examined by the Biological Survey at Washington only two contained remains of peas. These birds are sometimes accused of eating grapes, but I have seen no evidences of this. During the past summer Mr. King, my assistant, and I found them eating wild mulberries, black berries, common elderberries and wild black cherries. The Baltimore Oriole is said to feed upon beetles, bugs, ants, wasps, grasshoppers and some spiders. The beetles are principally click beetles or "snapping bugs," the larvae of which are very desttructive.

The Sparrows.

To essay the task of describing in even the briefest manner the food-habits of our thirty different species of native Sparrows is a very difficult undertaking. Already, in the opening paragraph of this chapter, some of the general marks of this family have been set forth. It now becomes necessary to take up this family and study the various members of it in a more detailed fashion. This family of thirty members may be divided into three groups—the first group containing eight species of rather brightly colored finches, the second containing sixteen species of very plain striped birds, and the last containing six species of Grosbeaks and their near allies. This arbitrary classification is for convenience only and has no particular basis in morphological relationships. This first group includes the rare Pine Grosbeak, which has rarely been seen in West Virginia; the somewhat erratic Purple Finch, found almost any place in the State during the winter, but only in the mountains in nesting time; the American and White-winged Crossbills, both of which are rare, the last especially so; the northern Red-poll which has been seen in this State only once; the almost omnipresent Goldfiinch which is distributed so generally throughout the State in summer and remains in some sections during the winter months; the peregrine Pine Siskin, which is abundant during some autumn migrations, and at other times may not occur for a number of years; and that rare white bird of the far north, the Snowflake. The second group embraces such plainly marked birds as the Vesper Sparrow, Savannah Sparrow, Grasshopper Sparrow, Lark Sparrow, White-crowned Sparrow, White-throated Sparrow, Tree Sparrow, Chipping Sparrow, Field Sparrow, Slate-colored Junco, Carolina Junco, Bachman's Sparrow, Song Sparrow, Lincoln's Sparrow, Swamp Sparrow, and Fox Sparrow. Some of these are rare and others are most abundant. The last group is made up of the generally distributed Towhee or Chewink, which is to be found in every part of the State; the gorgeous Cardinal or "Redbird," the well-named Rose-breasted Grosbeak, found in most parts of the State only in migration seasons, but nests in the mountains; the very rare Blue Grosbeak which I have never seen, though it has been observed by others within our State lines; the very common Indigo bird; and the vanishing Dickcissel. This is the complete list of our Sparrows.

The Food of Sparrows.

While some of the Sparrows have food-habits that are exclusively their own, there is a great similarity in the food that is eaten by all the members of this family. In the main it consists of insects in the summer and weed seeds in the winter. Of course some species feed, to some extent, upon fruit, and others vary their diet slightly with various things, yet nearly all of the thirty species of Sparrows feed upon insects in the summer and weed seeds in the fall and winter. Such species as the Pine Grosbeak, Purple Finch, the Crossbills and Redpoll feed largely upon the seeds of trees, especially such as grow in the evergreen forests of the north. The Purple Finch often feeds upon the

Photo by Fred E. Brooks

Nest and eggs of Lark Sparrow.

blossoms of certain wild and cultivated fruit trees, though no harm is done in this way. The Goldfinch, which is often called "Beet Bird," "Lettuce Bird" or "Wild Canary," is common all over the State. It is found in such abundance that its food is very important. As some of its names indicate, it is often found feeding upon the leaves of some of our garden plants, though not in a destructive manner. The seeds of the dandelion, thistle, ragweed and catnip are especially sought for by the Goldfinch. Prof. Forbush says, "Goldfinches feed their young largely on plant lice, caterpillars, small grasshoppers, and beetles. During the spring, when unhampered by family cares, and wandering through fields and orchards, where they feed considerably on cankerworms. They sometimes frequent grain fields, where they are said to devour noxious insects, including the Hessian fly. Goldfinches often feed very largely in winter on the eggs of plant lice; this has been observed many times. Mr. Kirkland examined the stomach of one of these birds, and found it contained two thousand, two hundred and ten eggs of the white birch aphid." There is a large number of our plainly colored Sparrows that feed almost entirely on the ground, either in the fields or in thickets. Such Sparrows as the Vesper, Lark, Grasshopper, White-crowned, White-throated, Song, Swamp, Fox and the Slate-colored and Carolina Juncos are terrestrial and feed on such insects and weed seeds as they can gather up on the ground or among the glasses and low shrubbery. So great are the numbers of these ground-haunting Sparrows that the surface of the ground is thoroughly searched many times each year and vast quantities of hurtful insects and pernicious seeds are gathered and eaten. Prof. Beal says, "Many grasshoppers are eaten, and in the case of the Chipping Sparrow these insects form one-eighth of the food. Grasshoppers would seem to be rather large morsels, but the bird probably confines itself to the smaller species; in deed, this is indicated by the fact that the greatest amount (over 36 per cent) is eaten in June, when the larger species are still young and the small species most numerous. Besides the insects already mentioned, many wasps and bugs are taken. Predaceous and parasitic Hymenoptera and predaceous beetles, all useful insects, are eaten only to a slight extent, so that as a whole the Sparrows' insect diet may be considered beneficial." Some grain is eaten by a few of the Sparrows but not to a harmful extent. I have observed the Field Sparrow feeding, to a very limited extent, upon sweet cherries, sour cherries, cultivated grapes, the wild black cherry, wild red cherry, mulberry , service berry, and blackberry. The Chipping Sparrow also feeds upon fruits as follows: Black sour cherry, black sweet cherry, currant, wild red cherry, wild mulberry, service berry, red elder berry and blackberry.. The Carolina Junco, that interesting subspecies of "Snowbird" that is to be found in the Allegheny Mountain regions of the State was observed last summer eating the fruit of the wild red elder berry in the mountains above Pickens. I have observed many of our other Sparrows eating wild and cultivated fruits in considerable quantities. For instance, the Cardinal was observed last season feeding upon the fruit of the cultivated sweet cherry, sour cherry, wild mulberry, bird cherry, wild black cherry, flowering dog-

wood, poison ivy, common elder berry, and blackberry. On some of these fruits the Cardinal feeds quite freely and on others very sparingly.

Considering all things we must conclude that the Sparrows are well worthy of protection since they contribute very much to the farmer's welfare against weeds and insect pests.

The one alien member of this family, the English Sparrow, was introduced in this country more than half a century ago, has spread very rapidly, and its work of injury is carried on all over our country. In some way this harmful species should be destroyed.

CHAPTER IX.

TANAGERS, SWALLOWS, WAXWINGS AND VIREOS.

Families Described.

There is no special reason why these four families should be grouped together except that they are near together in the present system of the classification of our North American birds. Each one of these families is quite distinct from the others in many ways. The characteristics may be summarized as follows: (1) The Tanagers. These are arboreal, forest-inhabiting birds, of brilliant plumage and mostly of the tropical regions. Only four of the more than 350 species reach the United States, and of these four, only two are found in West Virginia. These are the Scarlet Tanager and the Summer Tanager. (2) The Swallows. Six members of the Swallow family occur in our State. They are all small birds that spend practically all their time in the air where they gather their insect food. They are strong of wing and fly long distances. Though of almost the same size these birds differ very much in habits, especially in the matter of nest-building. Some build in holes in the ground, others make their nests of mud on the rafters of barns, and the Purple Martin makes it nests in houses provided for that purpose. The six species present in our State are the Purple Martin, Cliff Swallow, Barn Swallow, Tree Swallow, Bank Swallow and Rough-winged Swallow. (3) The Waxwings. This family has one lone representative in this State and that is the well known Cedarbird or Cedar Waxwing. Only one other species, the Bohemian Waxwing, is to be found in North America. The Cedarbird is very fond of fruit of many kinds, is songless, and may be readily distinguished from other species by the red wax-like substance on their wings the erectile crest, and the yellow band across the end of the tail. These birds are about the size of the Bluebird. (4) The Vireos. This is one of our most interesting families. Like the Warblers the Vireos are nearly all birds of the woods, though one or two species may be found in our orchards or along the streets where shade trees grow. As the Latin name, *vireo*, indicates these birds are greenish in color, though some are rather gray than green. All are of dull colors and none of them has very striking marks of any kind. The species found in West Virginia are, the Red-eyed Vireo, Philadelphia Vireo, Warbling Virea, Yellow-throated Vireo, Blue-headed Vireo, Mountain Vireo and White-eyed Vireo. Further characteristics of these various families will appear in the more detailed studies given below.

The Tanagers.

The males of both species of Tanagers found in this State are brilliantly red, the Summer Tanager being entirely red, though of a rather pale shade, while the male Scarlet Tanager is most gorgeously red with black wings. The females bear very dull plumage of an olive-green color, their wings being fuscous. Both species live on insects and fruit. In some sections of the country the Summer Tanager is called the

Photo by Fred E. Brooks

Orchards about our homes attract Tanagers, Vireos and Warblers.

"Southern Bee Bird," and is said to destroy a great many honey bees. Otherwise its food is of such a character as to be helpful to those who depend in any way upon forest products. The Summer Tanager is found chiefly in the southern part of the State and does not occur in the mountainous sections. The Scarlet Tanager is common in mountains and in the lowlands alike. Wherever there are large forested sections this bird of flaming plumage may be found diligently about its work among the trees. It has been called the guardian of the oaks, since it gathers much of its food from the oak trees. Many large moths such as *Catocalas*, *Cecropias* and *Lunas* are eaten by these birds, and they do good service in the destruction of many kinds of caterpillars and wood-boring and bark-boring beetles and weevils. Prof. Forbush says that they are almost entirely insectivorous and suggests that they eat very little fruit. However, during the past summer and fall I found these birds feeding upon the following cultivated and wild fruits—sweet cherry, wild black cherry, bird cherry, black mulberry, service berry and black-berry.

Swallows.

The Swallows are the special guardians of the air. Every one is familiar with the graceful flight of these little birds as they go about seeking their insect food or go coursing through the air for the real pleasure of it. Almost all our Swallows are of metallic coloring, though the Bank Swallow and Rough-winged Swallow are dull grayish brown above and lighter underneath. The Barn Swallow may be identified by his long forked tail, the Cliff Swallows by his strange nest, the Tree Swallow by his pure white breast, while the Purple Martin needs no introduction for even the children know this semi-domestic bird. All the Swallows are insectivorous, and great numbers of insects are destroyed by them. It is said that the Purple Martins eat great numbers of the harmful striped cucumber beetle. As the Barn Swallows fly over the meadows and pastures they eat the moths of many species of small cutworms that feed upon the grass. Cliff Swallows feed on the pests of grass lands and cranberry bogs. All Swallows are beneficial birds. In the south these birds are especialy destructive to the cotton boll weevil. This fact alone makes them of very great econnmic worth.

Cedar Bird.

As the two common names, "Cherry Bird" and "Cedar Bird," indicate the Cedar Waxwing is fond of fruit. When the first cultivated sweet cherries begin to ripen the Cedar Birds usually come in considerable number and often eat quantities of the fruit. Other fruits eaten by this bird are the cultivated sour cherries, and strawberries. A few years ago some strawberry beds in Lewis County were frequented by the Cedar Birds and great quantities of the berries eaten. Of wild fruits I have seen these birds eating the berries of the black gum, wild black cherry, bird cherry, service berry, black mulberry, black haw, hack-berry, sassafras, flowering dogwood, poke berry and common elder berry.

It has been found that in some places they eat many of the berries of the red cedar and the mountain ash. In the mountains where these birds are always common in summer time and where the "bird" cherry abounds I have no doubt that the birds act as a distributing agency for the seeds of this wild fruit tree. Thus the seeds are scattered everywhere, and when the forest is cut over or burned over, they spring up and immediately a new forest growth is begun. Though some valuable fruit is destroyed by these birds, much good is done in the manner just indicated and many harmful insects are consumed. On the morning of June 8, 1914, I sat by our camp fire on the border of the great Cranberry Glades. Some "bird" cherry bushes were growing near by and the branches of these had several small nests of the tent caterpillar. As I sat listening and watching a Cedar Bird flew into the bushes, immediately tore open one of the nests of these destructive insects and ate three of the young caterpillars. This took place so near at hand that I saw the whole performance clearly. I find that other observers accredit the Cedar Bird with eating elm leaf beetles, grasshoppers, crickets, inhneumon files, crane flies, lacewing flies and cutworms. In Farmer's Bulletin No. 54, page 38, Prof. Beal speaks of investigations concerning the food-habits of this bird made by the Biological Survey of the United States Department of Agriculture. He says, "In 152 stomachs examined animal matter formed only 13 per cent. and vegetable matter 87 per cent, showing that the bird is not wholly a fruit eater. With the exception of a few snails, all the animal food consisted of insects, mainly beetles—all but one more or less noxious, the famous elm leaf beetle being among the number. Bark or scale lice were found in several stomachs, while the rest of the animal food was made up of grasshoppers, bugs, and the like. Three nestlings had been fed almost entirely on insects. Of the 87 per cent. of vegetable food, 74 per cent. consisted entirely of wild fruit or seeds and 13 of cultivated fruit, though a large part of the latter was made up of blackberries and raspberries, which may or may not have represented cultivated varieties. Cherry stealing is the chief complaint against this bird, but of the 152 stomachs only 9, all taken in June and July, contained any remains of cultivated cherries, and these aggregated but 5 per cent. of the year's food. As 41 stomachs were collected in these months, it is evident that the birds do not live to any great extent on cultivated cherries."

The Vireos.

As suggested in the opening paragraph of this chapter the Vireos are obscure birds, their plumage being olive-green, gray or brown with a few insignificant markings, the under parts of all being white or nearly white, though in the case of the Yellow-throated Vireo the throat and breast are rather bright yellow. In general behavior the Vireos are much like the Warblers, and nearly all of our species are woodland birds. They build pensile nests, are quite musical and are far less shy than some of our other forest birds. One can approach so near a female Red-eyed Vireo, when she is on her nest, that the rich ruby-

red iris may be seen. Some of these birds are quite confiding in disposition and can be studied with the greatest ease. Then, too, it is never difficult to find the Vireos nor their nests, because they sing or scold or call all day long and their whereabouts is never in question. I have often followed the song of the Red-eyed or Yellow-throated Vireos for a long distance knowing that I would find associated with them other woodland birds. The Vireos are good guides to the bird-student when he goes into the woods looking for interesting species. The song is loud and he goes into the woods looking for interesting species. The song is loud and may be heard at a long distance. In West Virginia we have seven species. Though they all differ in very striking fashion there are close resemblances in many respects. The Red-eyed Vireo is a common summer resident. I have found this bird in all sections of the State. Several times in the month of July I have seen these birds fly silently into a bush of the alternate-leaved dogwood and eat several of the berries. They seem to be especially fond of this kind of fruit. I have also seen this species feeding upon cultivated sweet cherries, wild black cherries, "bird" cherries, mulberries, sassafras berries, black-fruited holly, and common elder berry. The Red-eyed Vireo is recognized as a great insect eater. Mr. Arthur C. Gilbert says he fed a young bird of this species a hundred grasshoppers in one day and he ate them all. The Philadelphia Vireo is very rare and has been taken but once in this State. On the other hand the Warbling Vireo, which the Philadelphia so closely resembles, is very common and is the most sociable bird of this family. Any day from April to October this little gray Vireo may be heard singing a most pleasing song out among our orchard trees or in the shade trees along the city streets. Many a man has been unconsciously cheered by the bright song of this little hidden optimist. The food of this species is made up almost entirely of the insects that feed on the leaves of trees. The Yellow-throated Vireo is larger than some of the others and, as his name indicates, is of more striking colors. This species is a superior songster and his rich contralto voice can be heard from far away. Like the Red-eye his food is gathered in the tops of forest trees, especially the oaks, and among the shrubbery in woodlands and fields of second growth. The Blue-headed Vireo is a beautiful bird with bright grayish-blue head and white eyerings. It is only a migrant here, is quite rare and is of no particular economic value in this section. The Mountain Vireo is a southern form of the last named species. It reaches its northern limit in the Alleghenies of western Maryland and northern West Virginia. I have found this species to be quite common in the mountains of our State. Last summer Mr. Orr R. King, my assistant, found this species feeding upon the fruit of the red elder berry and service berry at Pickens, Randolph County. The last species on this list of Vireos is the White-eyed Vireo. It is found only within the limits of the Carolina Life Zone in our State, that is, in the southern parts of the State and along the Ohio, Little Kanawha, Elk and Monongahela Rivers, up to an altitude of about 1,500 feet above sea level. The White-eye is most common in old grown-up fields and along streams that are bordered with shrub-

bery. Like the other Vireos it is largely insectivorous and is a useful bird.

CHAPTER X.

THE WARBLERS.

Thirty-six Species.

Thirty-six species of Warblers have been recorded from West Virginia. With a few exceptions these are all birds of the forest. The Yellow Warbler is common in orchard and shade trees, the Yellow-breasted Chat is found out in old fields, the Maryland Yellow-throat is to be seen in grassy places and along rivers and smaller streams, especially loving a swampy region, the Golden-winged Warbler delights in a field of sassafras and blackberry briers, and a very few others resort to places where they may be easily seen, but most of these small and beautifully-colored birds find their favorite haunts in the woods and many of them keep provokingly high up in the tops of the tallest forest trees. On this account few persons know of the presence, beauty and usefulness of this large family of birds. Only one, the Myrtle or Yellow-rumped Warbler, is to be found here in the winter, and that very rarely. Many remain here during the nesting season and the others are migrants, passing us in the spring and fall. Practically all are useful species. Just at the time when our apple and other fruit trees are in bloom, and for a few weeks following, almost innumerable hosts of these small birds feed among our orchard and forest trees. Because of the long migration flights these birds have just finished or are in process of making, they are very hungry. Their food consists almost entirely of small insects, their eggs, larvae and pupae. Coming as they do when many of the harmful caterpillars are just emerging from the egg and many other species of insects are beginning their spring work of devastation among the forest and fruit trees, they are exceedingly useful. The Warblers are so small that they can easily go to the extremities of the smallest twigs and find the tiny insects among the buds, small leaves and flowers. Though their food is made up of very small arboreal insects, for the most part, they are none the less useful. Some of the smallest insects are most harmful, and these the Warblers destroy by myriads.

Systematic Work.

Concerning the feeding habits of the Warblers Prof. Forbush has said, "In this family we find birds that assume the care of the trees from the ground to the topmost twig. Some walk daintily along the ground, searching among the shrubbery and fallen leaves; others cling close to the bark, and search its every crevice for those insignificant insects which collectively form the greatest pests of forest and orchard; others mount into the tree, skip from branch to branch, and peer about among the leaves or search the opening buds of the lower branches; others habitually ascend to the tree tops; while still others are in almost constant pursuit of the winged insects that dart about among the branches." The work these birds do in policing the trees is surely systematic. By

Photo by Fred E. Brooks

West Virginia mountain stream under the overhanging banks of which Louisiana Water-Thrushes nest.

the time the Warbler hosts have passed us in the spring practically every bud, leaf, twig, flower and incipient fruit has been carefully inspected and rid of some insect enemy. A brief study of a few of our more important species will give illustrations of how this work is done.

Yellow Warbler.

The Yellow Warbler or "Summer Yellow Bird" is the member of this family that is recognized perhaps most often. From the last days of April up to early fall this little yellow bird may be observed singing and hunting insects about our shade trees, along the willows of some stream or among the fruit trees in orchard or yard. The male is a clear lemon yellow with orange-colored stripes on his breast, while the female lacks the orange stripes and has more of an olive green tinge to her plumage. This species is common throughout most sections of West Virginia and should be appreciated greatly by all orchardists. It feeds on many of the worst pests that attack fruit trees, shade trees, vines and berry bushes, and destroys great numbers of small caterpillars before they have grown to a really destructive size. Among the insects destroyed by the Yellow Warbler are the young tent caterpillars and cankerworms, bark beetles, weevils, plant lice, codling moth, flies and spiders. Very little fruit is eaten by this species, though I have observed them taking tiny particles of the fruit of the mulberry.

Cape May Warbler.

The Cape May Warbler is a rather inconspicuously colored little bird that passes northward in the spring and returns in the fall. As they pass going each way great numbers of these birds remain with us for a few weeks, especially in the fall. The immense numbers of these little birds reach this section just as the cultivated grapes are in their prime. And because of the great harm they sometimes do in our vineyards they are chiefly known. The Cape May Warbler, at times, destroys great quantities of this fruit by puncturing the ripe grapes and drinking the sweet juice. After the grape is thus punctured by the birds the bees and wasps come and finish the work of destruction. I have known vineyards of considerable size here in West Virginia in which practically all the grapes were destroyed by these birds. Last fall (1915) I found these small brown birds feeding upon the grapes in a number of places within our State. In addition to grapes I have found these birds feeding upon wild black cherries, common elder berries, poke berries and the fruit of the Fringe Tree. Last fall I watched several trees of the last named species and noted how greedily the Cape May Warblers fed on the large purple drupes. At first they came to these trees and ate sparingly of the fruits, but as they ripened the birds were in the trees practically all the time till the last vestige of fruit was gone. The cultivated grapes seem to make up the larger part of the food of these birds while they are here. Mr. Charles Handley informs me that he has seen this species feeding on the fruit of the Virginia Creeper or Five-leaved Ivy. I suspect

that as a fruit destroyer this is our most harmful species. No doubt many insects are destroyed by the Cape Mays.

Black-throated Green.

Another species of very general distribution and of considerable importance is the Black-throated Green Warbler. The name itself gives a very good description of this bird. It is found in many sections of our State in the summer and almost everywhere during the two migration seasons. This species is most common where evergreen forests abound. As an enemy of forest insects this bird is of real economic worth. It feeds upon small caterpillars, beetles, etc. Last fall it was observed by Mr. A. B. Brooks eating the ripe fruit of Hercules' Club. I have seen it eating the fruit of other wild varieties.

Myrtle Warbler.

The Myrtle Warbler may be seen in large numbers during the fall migration, occasionally in the spring as it passes northward, though migrating rather late in the season it lingers only a few days in this latitude, and sometimes in the winter. For several years a few Myrtle Warblers have spent the winter at Weston, depending upon certain wild fruits for food. As soon as these birds appear in the fall they search out places where great quantities of poison ivy vines grow. On the dry grayish-brown fruits of these vines the birds subsist nearly all winter. I have seen them feeding on the fruit of the poison ivy a great number of times, and this fruit seems to be their chief food during the fall migration season and in the winter time. No doubt some other kinds of wild fruit are eaten, though I have no notes to indicate this. It is said that they eat great quantities of bayberries where these grow. Dr. Weed has made a special study of the autumn food of this species. He found that they fed upon caddis flies, various insect larvae, beetles, plant lice and their eggs, house flies and other diptera, and a very few hymenopterous insects. Prof. Forbush has found the Myrtle Warbler feeding upon the woolly apple tree aphis.

General Notes.

In this brief chapter it is impossible even to mention all the species in this large family. Only a few have been described. These are among the most important species, yet others are of economic value, and perhaps the Warblers do far more for the preservation of trees and other valuable forms of plant life than we commonly think. It is evident that the Black-and-White Warbler eats many insects that feed upon the trees over which these small creeping birds hunt constantly. The great number of species that feed on the ground or near the ground are of much value. Among these are the Kentucky Warbler, the Worm-eating Warbler, the Maryland Yellow-throat, the Water-Thrush and the Louisiana Water-Thrush, the Connecticut Warbler, Mourning Warbler and Oven-bird. Then, too, there are the Chestnut-sided Warbler, the Hooded Warbler, Magnolia Warbler, Prairie Warbler, Wilson's Warbler and

Yellow-breasted Chat that feed largely among the smaller trees and bushes. There are also the tree-loving Warblers such as the Blue-winged, Nashville, Tennessee, Cerulean, Black-poll, Bay-breasted, Blackburnian, Pine and Redstart. All these have their favorite food and do their great part in the preservation of our forests. I have made records on the fruit-eating habits of a few of these species, though most of them live almost altogether on insect food. The Cape-May Warbler, the Tennessee Warbler, the Magnolia Warbler and the Black-throated Blue Warbler have been seen eating the fruit of the cultivated grape. I have observed the Bay-breasted Warbler eating the fruit of the Flowering Dogwood, and last fall I saw the rare Wilson's Warbler feeding upon the fruit of the wild black cherry. While in the mountains last summer Orr R. King, my assistant, saw the Magnolia Warbler, Cairn's Warbler and Maryland Yellow-throat feeding upon the fruits of the red elder berry. No doubt these little birds do a great service in sowing broadcast the seeds of many fruit-bearing shrubs and trees that quickly spring up after a woodland is cut over or burned and thus aid in reforestation. Many of the seeds of the "Bird" Cherry or wild cherry are scattered by the Warblers. I have seen great flocks of these birds feeding on the red, insipid fruit of these trees. Every one who has studied forest conditions in West Virginia knows how important is the part of this species of wild cherry in the reforesting of our mountain regions now so rapidly being stripped of their immense virgin forests by fires, lumbermen and other destructive agencies. If for nothing else than their great worth as seed sowers the Warblers should be protected.

CHAPTER XI.

THRASHERS, WRENS, KINGLETS, NUTHATCHES AND TITMICE.

A Complex Group.

In this motley array and somewhat conglomerate group of birds we have species of five different families as indicated in the caption of this chapter. In this part of the country these five families are represented by but few species and they can not be described in separate chapters. The first of these families includes the Mockingbird, Catbird and Brown Thrashers; the second family is made up of five species, the Carolina Wren, Bewick's Wren, House Wren, Winter Wren and Long-billed Marsh Wren; the third family includes three very diminutive species, the Golden-crowned Kinglet, Ruby-crowned Kinglet and Blue-gray Gnatcatcher; the fourth family has only two members that are found in our State, the White-brested Nuthatch and the Red-breasted Nuthatch, while the last family includes the three Titmice, Tufted Titmouse, Chickadee, and Carolina Chickadee. Perhaps there should also be included in this group the lone representative of the Creeper family, the Brown Creeper, and a few other rare species scarcely ever occurring within our State. As may be learned by observation or by the reading of this chapter, these birds differ greatly in the appearance, songs, food, nesting, and general conduct. In the following paragraphs a short account of these families will be given.

Mockingbird, Catbird and Thrasher.

The first family includes the Mockingbird, Catbird and Brown Thrasher. The Mockingbird is found in the summer time in the southern part of the State and in the valleys east of the mountains. In no place in West Virginia is this famous bird very common, and in many sections it is not found at all. Last summer I found a little family of Mockingbirds at Lewisburg and was told by Mr. Charles O. Handley that they are occasionally seen in that section at almost any season of the year. I was greatly interested in seeing them feed on the berries of an early-ripe species of holly that is found in great abundance in the frequent depressions in the lime-stone plateaus of that section. The food of the Mockingbird is made up of insects and fruit.

The most common member of this family is the well-known Catbird. Its onomatopoetic notes may be heard almost anywhere from the lowest valley to the highest mountain from the last week in April to the first week in October. Its distribution is general throughout the State and its presence adds much to the pleasure of out-door life. Our Catbird is a near relative of the true southern Mockingbird just mentioned. So well do all our teachers, farmers and boys and girls know this bird that no description of its appearance is needed. Its food-habits, however, should be studied carefully. In some places the Catbird is a serious annoyance to fruit growers. About one-half of the food of the Catbird consists of insects, many of them being of destructive species, while

TUFTED TITMOUSE

Order—PASSERES
Genus—BÆOLOPHUS
Family—PARIDÆ
Species—BICOLOR

National Association of Audubon Societies

the other half is made up of fruit, one-third of which is of the cultivated varieties such as cherries, strawberries, blackberries and raspberries. During the past summer I have found these birds feeding upon sweet cherries, sour cherries, wild goose plums, raspberries, currants and strawberries. Of the wild fruits I have seen them feeding upon at least fifteen varieties. The Catbird is very fond of the wild mulberry and I have seen birds make as many as twelve trips to a single tree within half an hour. The other wild fruits upon which I have seen the Catbird feeding are the wild black cherry, holly, service berry, blackberry, common elder berry, red elder berry, barberry, sassafras, frost grape, flowering dogwood, silky dogwood, poke berry, virginia creeper, and common greenbrier. In most cases these fruits are swallowed whole by the Catbirds and the seeds, of course, are scattered far and near. Considering these facts, I think we must conclude that the Catbird is our friend rather than our enemy and should be protected.

The Brown Thrasher is a large brown bird with speckled breast. Sometimes it is called "Mockingbird" in certain sections of our State. The name is not inappropriate, for this bird is as truly a mocker as the far-famed Mockingbird. It is common in most parts of West Virginia but rather rare in the mountains. The food of this species is made up of fruits of various kinds and insects. A few of the insects it destroys are beneficial ones, but the larger part of them are harmful ones. The Brown Thrasher has been accused of pulling young corn stalks, and the charge may be true. It is well-known that some cultivated fruits are destroyed by this bird and that occasionally grain is eaten. However as Prof. Beal says, "Taken all in all, the Brown Thrasher is a useful bird".

Wrens.

The Wren family is exceedingly interesting because of the friendly ways, the alert dispositions and the musical ability which they possess. Where the Wrens abound they go searching through every cranny and crevice of our out-buildings, along fence-rows and in the thickets and piles of logs and brush. No place where larvae lurk or where the eggs or pupae of insects may be hidden away is left unexplored. As regards food habits all the Wrens are entirely beneficial. Of our five species one, the large Carolina Wren, remains here throughout the entire year; two, the Bewick's Wren and the House Wren, are summer residents; one, the Winter Wren, comes only in the winter in most sections of the State, though in the higher mountain regions it remains throughout the year, while the remaining species, the Long-billed Marsh Wren, is so rare that it need not be discussed at all. East of the Alleghenies the House Wren is most common and west of the mountains the Bewick's Wren is the prevailing species. All these Wrens are insect eaters and should be protected most carefully.

Nuthatches.

We have two species of birds that spend their entire time exploring

the tree trunks in search of various forms of insect life that are hidden away under the edges of the bark. These are the White-breasted and the Red-breasted Nuthatch. The former is very common and the latter quite rare. Sometimes these little birds are called "Sapsuckers," but the name is incorrect. Some of the insects upon which they feed are extremely harmful. It is a well established fact that they destroy great numbers of insects that are harmful to our forests and orchards. The diet is varied, now and then, with a few nuts, weed-seeds, grains, and fruits, though, for the most part, the food is made up of harmful insects.

Titmice.

Like the Nuthatches the Titmice search assiduously among the branches and along the trunks of trees for insects that may be found in such places. All three species, the Carolina Chickadee, the Black-capped Chickadee and the Tufted Titmouse, are entirely beneficial and no harmful act can be charged against them. They are small birds and the Carolina Chickadee and the Tufted Titmouse are very common in most parts of the State. High up in the mountains the other Chickadee is found. Usually the two more common species are to be found in great numbers in any locality and with their watchful eyes they seek out many an insect and destroy it. The character of the food of these little birds gives a peculiar value to their services, for it consists largely of very small insects or eggs which the larger birds pass by unnoticed. I believe the Tufted Titmouse is one of our most beneficial woodland birds.

Gnatcatcher and Kinglets.

The Kinglets and the Blue-gray Gnatcatchers are exceedingly small birds and their diminutive size causes us to know very little of them. All three species live almost entirely on diminutive insects, such as hide away among the leaves and leaf buds where other birds do not find them. The Blue-gray Gnatcatcher is to be found here throughout the summer, is very common and may be called a useful species. The Ruby-crowned Kinglet is a migrant and is to be seen only in spring and fall as it passes on its semi-annual migration flights. The Golden-crested Kinglet remains in most sections of the State throughout the winter, but is to be found in summer time high up in the mountains. The Kinglets are very useful birds because of the large number of tiny insects which they destroy.

Special Value.

All the birds mentioned in this chapter are characterized by their unusual activity and their persistence in searching for their insect food. They go into many a hidden place where other birds do not usually venture. In this way insects are killed that otherwise would escape. Of particular value are the Nuthatches and Titmice because of their diligent search for such insects as are harmful to our forests.

Photo by Fred E. Brooks

Nest of Veery at Base of Spruce Knob.

CHAPTER XII.

THE THRUSHES.

Family Characteristics.

This last group, which we have undertaken to study, includes the most perfectly developed forms of bird life, the Thrushes. In beauty of song, in graceful bearing and in perfection of structure these birds are entitled to their place at the top of the list. In their food-habits, too, they are of very marked importance as may be noted in our detailed study of the family. About six hundred species, distributed throughout many parts of the world, belong to this well-known family. Of these about twelve are found in the United States and six have been recorded from West Virginia. The members of this group are well and favorably known. Perhaps no other group of birds contains species so well loved and so fervently admired as the Thrushes. In this family are included the Mavis or Throstle and the Blackbird or Merle of Europe and our own Robin and Bluebird. All these are well known in the places where they are to be found and are greatly admired because of their musical ability. Some are very retiring in habits and are rarely found outside the deep forests. Others are very familiar and may be seen in great numbers about our homes. The Robin is one of our best known species and comes with utmost freedom to any favorite feeding place in garden, orchard or lawn. The Bluebird is not at all shy in some sections and we rejoice to know that this beautiful species is still quite abundant in many parts of our State. In some of our larger towns and cities the Wood Thrush is also quite tame and may be seen feeding and singing freely about the yards and gardens. Especially is this true of Charleston, Morgantown and Fairmont. The other Thrushes are wary and are rarely observed unless one goes to their haunts in the woods.

List of Our Species.

The six species listed in West Virginia are the Wood Thrush (*Hylocichla mustelina*), Veery or Wilson's Thrush (*Hylocichla fuscescens fuscescens*), Olive-backed Thrush (*Hylocichla ustulata swainsoni*), Hermit Thrush (*Hylocichla guttata pallasi*), Robin (*Planesticus migratorius*) and the Bluebird (*Sialia sialis sialis*). Two of these are very readily distinguished the one from the other. It is a part of the common knowledge of almost every boy and girl in West Virginia to be able to identify the Robin and the Bluebird at sight. The brickred-breasts of these two birds, the azure blue of the back of one and the familiar colors of the other serve to make these two familiar to all of us. But the other Thrushes are not so readily distinguished. All four are brown on their backs and all four have speckled breasts. To add to this confusion the Brown Thrasher, described in the last chapter is similar in its color pattern, and other species are of like coloration. One or two simple rules will help greatly in the identification of these birds. All are about the size of a Robin or a little less. On the backs of these four

Thrushes two shades of brown are to be noted. One is a deep, rich, russet brown while the other is a far duller olive brown. The Wood Thrush has the brighter shade of brown on its head and the duller shade on its lower back and tail; the Hermit Thrush is exactly the reverse in color arrangement having the brighter shade on its tail; the Veery has the russet brown, or brighter shade over its entire upper parts, while the Olive-backed Thrush, as its name indicates, is characterized by an olive-green back. There are other differences, but the one just pointed will help greatly in the identification of the species. Of the four the Wood Thrush is most common in nearly all sections of the State. As a vocalist it has few, if any, superiors. I shall never forget my experience with these birds in certain localities in interior West Virginia. In the evening, early morning and on cloudy days these birds sing such songs as one can never forget. The Veery is highly accomplished as a songster and makes wild, sweet music in our mountain woodlands where this species may be found in the summer time. In most sections of the State the Veery occurs only as a migrant. The Olive-backed Thrush sings a very strange song, and few have been able to hear it in the medley of song during the migration days of late spring when this species passes northward or on toward the higher Alleghenies where it occasionally nests. I have seen two nests of this obscure species in West Virginia. One was on the top of Spruce Knob in Pendleton County and the other was on Shaver's Mountain in Randolph. Altogether the Olive-back, though very common in migration season, is a stranger to most of us. The remaining member of this quartet of Thrushes is, by some, claimed to be the most musical of all. We have the Hermit Thrush only as a migrant or rare winter visitor. A few times I have found this species in mid-winter, but usually see it only in the latter days of March or up to the middle of April, when it passes quietly northward, stopping for a few days in our leafless woods to gather a few early insects.

Their Food.

Some members of the family are very important economically. All do some service, though two or three of them are of no very great value except from an esthetic standpoint. The food of the Thrushes consists almost entirely of insects and fruit. Some of the species, the Robin and Wood Thrush, for instance, are particularly fond of certain kinds of fruit and, at times, become quite destructive to valuable varieties. However, they more than atone for all the harm done by the great number of insects destroyed. The four brown Thrushes, the Wood Thrush, Olive-backed Thrush, Hermit Thrush and Veery, are distinctively birds of the forest. All excepting the first, the Wood Thrush, spend practically all their time in the deep forests and there they gather their food. The Wood Thrush is, for the most part, a forest-loving species and is usually just as wild as the others. So it may be said that these four species gather their food in the woods and are of value in their destruction of insects that feed on forest vegetation. They, of course, destroy some wild fruits and occasionally come out of the forest

to feast on the more tempting cultivated varieties. In our detailed study of the Robin and Wood Thrush the economic value of the Thrushes will appear.

The Wood Thrush.

In the first place, as a representative of this group or family, we shall study the Wood Thrush. There is scarcely a place in West Virginia where this fine songster is not to be found. Indeed I do not recall a single locality that I have visited wherein the Wood Thrush was a stranger. When I climbed, a few years ago, to the top of Spruce Knob I found it there; along the lower river bottoms it is by no means rare; and throughout the hilly interior sections it is in many places quite abundant. The general range of the Wood Thrush includes all the eastern part of the United States. During the summer time it is found from Ontario and the northern New England States west to the Dakotas and Texas and south to northern Florida; in winter it is to be found in southern Mexico and the Central American states. As has been said, it is common in practically every part of West Virginia.

Food of the Wood Thrush.

Though much might be said in regard to the song, nesting-habits and general habits of this bird only its food can be discussed here. As is true with all our Thrushes the food of this species consists of fruit and insects. In recent investigations made by the Biological Survey, U. S. Department of Agriculture, 169 stomachs of this species were examined and their contents studied. These birds were killed in the eastern part of the United States and were taken from April to October. It was found that about 60% of the food of these birds consisted of animal matter, mostly insects, while the remaining 40% was of vegetable matter being made up mostly of fruits of various kinds. Among the insects were forty-six different species including such harmful ones as the May-beetle, snout beetles or weevils, click-beetles and the Colorado potato beetle. A few useful insects were found. In addition to the large number of beetles eaten by this species many caterpillars enter into this bird's summer diet. Prof. F. E. L. Beal says that ants seem to be a rather favorite food with all the birds of the genus *Hylocichla* and his investigations lead him to say that almost 9% of the entire food of the Wood Thrush consists of ants of various kinds. Flies, bugs, spiders, thousandlegs, snails and earthworms are also eaten. Surely it must be true that great numbers of insects that destroy the foliage of shrubs and trees are destroyed by this bird and its hungry young during the summer season. The fruit-eating habits of this species are very interesting. In the stomachs mentioned above Prof. Beal and his assistants found about 25 kinds of wild fruit. His conclusions lead him to say that of the 40% of vegetable matter making up the stomach-contents of these birds more than nine-tenths was fruit, mostly of wild varieties. Prof. Beal says, "Cultivated fruit, or what was thought to be such, was found in stomachs taken from June to September, inclusive. It was

eaten regularly and moderately, and the total for the season was 3.74 per cent of the whole food." In my own observations on the fruit-eating habits of this species I have found that it is not so fond of certain kinds of wild fruits as many of our birds are. In June and July of the past summer this species was observed eating raspberries at French Creek, and at Philippi; on July 20, 21, it was observed feeding freely upon the fruit of the wild mulberry.

The Robin.

The Robin is another one of our Thrushes that is of very great economic importance. In the spring and fall this well-known bird is found in great numbers as the large flocks of migrants pass us by going to, and coming from, their northern nesting grounds. Large numbers remain here in the summer to breed, and may be said to be one of our most common summer birds. A few are to be found in the winter and occasionally very large flocks are seen in the very coldest parts of the year. Last year (1914-1915) immense numbers of these birds spent the winter at Beckley, Raleigh County. In a letter from Dr. U. G. Cook I find this important information, as set forth in the following quotation from him. "I do not think it an exaggeration to say that a million Robins roost among the pines that are on the outskirts of Beckley. As the snow clears away they come down in innumerable flocks upon the bare ground seeking food." Though usually rare in winter, the Robin is with us during the greater part of the year and his place in the economy of nature is set forth in the following notes in regard to his food.

The Food of the Robin.

The appetites of Robins seems to be especially good and they devour great quantities of insect and vegetable food. I have seen Robins eat until they seemed to be stupid from their gluttony. At times they eat certain varieties of wild fruit in great quantities. So freely do they feed upon the first-ripe sweet cherries that their seputations are frequently ruined among fruit-growers and some of these valuable and beautiful birds are killed in consequence. But just as voraciously as they feed upon our early sweet cherries so do they feed upon certain of our harmful insects. It has been determined that the insect food of the Robin constitutes about 42% of the total food. This 42% is made up as follows: Beetles, 19%; Grasshoppers, 10%; Caterpillars, 6%; and other insects, 7%. Some of the insects, though very few, which the Robin eats, are beneficial. It is safe to say, however, that about one-third of the entire food of this familiar Thrush is made up of harmful insects.

About 4% of the Robin's food is cultivated fruit, and about 47% consists of wild fruits of many kinds. During the past summer I have found this bird feeding upon the following wild varieties of fruit:—Wild Mulberry, Service-berry, Blackberry, Red Elderberry, Bird Cherry, *Ilex mollis* (Holly), Common Elderberry, Pokeberry, Flowering Dogwood, Virginia Creeper, Mountain Ash, Black Haw, Black Gum and

Wild Black Cherry. At times Robins come in great numbers to certain kinds of wild fruit trees that are specially to their liking. At one time last summer my assistant noted twenty-three visits made by Robins to one mulberry tree in two and one-half hours. More than forty kinds of wild fruits are known to be eaten by these birds. Of course they act as distributors of the seeds of these species of fruit-bearing trees and greatly aid in the reforesting of burnt-over or cut-over areas. Among the cultivated fruits I have noticed these birds feeding upon sweet cherries, sour cherries, raspberries, currants, strawberries, and wild goose plums. Only the early fruits are harmed to an injurious extent. Some very early sweet cherries are eaten with great avidity and occasionally a whole crop is practically destroyed by the fruit-loving species of birds, though the Robins are not guilty of all the harm done.

Summary.

I think that no one who has heard a Robin sing early in the morning or has seen a Hermit Thrush in the woods in April or has visited the hounts of the Veery, found the interesting nest of a Bluebird or studied any of the habits of these Thrushes could be in favor of killing one of them. No family of birds is more in the poplar favor than these. They are the friends of the farmer and the enjoyable companions of every one who takes a walk in the deep woods, along a country roadside, through the old home orchard or far up in the mountains. These Thrushes add much to the joy of life and help us greatly in our never-ceasing conflict with the enemies of our fields, gardens and forests, the innumerable hordes of insects.

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